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ABSTRACT

This educational kit is designed to help teachers familiarize their students with the natural resources of Illinois. Materials in the kit are suitable for a wide range of grade levels and can be used in indoor and outdoor settings. These materials include a booklet and a set of 15 classroom activities. The booklet, written at an approximate fifth grade level, contains descriptions of 58 threatened and endangered plants and animals in Illinois. Information provided includes how and where the species lives and for what reasons it is facing the possibility of near or complete extinction in Illinois. The descriptions are arranged in sections according to the habitats in which the species are found. These habitats include: (1) prairie and open field; (2) forests; (3) wetlands and water; (4) dunes, cliffs, bluffs, and caves. Each section begins with a brief description of the physical characteristics of the habitat and the forces that in many cases are rendering habitats unsuitable for the species that depend upon them for survival. Instructional strategies and support information are provided for the 15 activities (which may be duplicated for student use). Activity topics include ecology studies, bird appreciation, a transect study, and others. (JN)

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ILLINOIS NATURAL HERITAGE CONSERVATION/ EDUCATION KIT

SPECIAL THEME: "REMEMBER THESE PRECIOUS FEW"

ILLINOIS ENDANGERED AND THREATENED PLANTS AND ANIMALS

ILLINOIS DEPARTMENT OF CONSERVATION ■ ILLINOIS BOARD OF EDUCATION

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these precious few

Illinois
Department of
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* * *

Forest Resources
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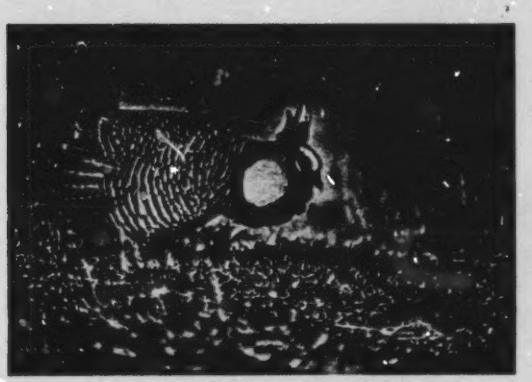


Illinois' Endangered and Threatened Plants and Animals

These Precious Few . . .

Illinois is blessed with numerous varieties of plants and animals, causing us sometimes to forget the hundreds of species of flora and fauna which for numerous reasons no longer can be found in the Prairie State--some which no longer can be found on the face of earth. We sometimes forget, too, those plants and animals which are struggling to keep a foothold in our state--some just barely holding on.

Currently there are well over 400 plants and animals that still exist in Illinois, but whose populations are extremely low in numbers. These constitute "These Precious Few," those species that either are classified as threatened or endangered.

Following, you will find accounts of some of the threatened and endangered plants and animals of Illinois--many of which also are included on a similar listing on a national basis. Unfortunately, limitations of space prohibit telling each of these species' life stories--the 58 species here representing only a small sampling of "These Precious Few."

In telling the life story of each threatened and endangered species, the accounts relate where the species lives, how it lives, and for what reasons it is facing the possibility of near or complete extinction in Illinois. Since the common need of all plants and animals is to have a clean, healthy habitat in which to reside, the species are arranged according to their required habitats. Each section begins with a brief description of the physical characteristics of each habitat, as well as the forces that in many cases are rendering habitats unsuitable for the species that depend upon them for survival. The habitats required for survival by these species include: prairie/open field, forest, wetlands/water, and dune/cliff/bluff/cave.

The centerfold of this issue contains a full-color poster depicting the 58 animals and plants described throughout this publication. A complete listing of the Illinois endangered and threatened species is provided on the reverse side of the centerfold poster.

'Endangered' species are considered those plants and animals facing the very real prospect of disappearing from the state, whereas 'threatened' species are those in peril of becoming endangered. We therefore have what amounts to a two-stage system which allows us to become aware of the problem as it affects a particular species before it becomes severe.

This brief anthology is presented to reaffirm the state's commitment to all threatened and endangered plants and animals innate right to survival in Illinois. This issue constitutes a barometer of where we are now, a scorecard of how our threatened and endangered species are doing in Illinois. Perhaps somewhere down the road we can look back at where we are now and see the progress that has been made in preserving "These Precious Few" for all those who will follow us.

Sally F. Stone, the author of "These Precious Few," has observed first hand the decline of plant and animal species. For the past two and a half years she has worked in the Endangered Species and Heritage Wildlife programs for the Department of Conservation. Currently she serves as the communications coordinator for the Natural Heritage program.

A special thank you goes to Bob Bridges, Eric Decker, Michele George, Ray Zoanetti, and Robert F. Eschenfeldt for the line drawings contained in "These Precious Few." Color photographs are courtesy of: Don Wright, John Schwegman, Carl Becker, Anthony Les, Robert Welch, F.N. Hamerstrom, Roy Lukes, Leo Johnson, Walter J. Breckenridge, Craig Faanes, Jon Cates, Patrick Redig, Lee K. Nelson, John MacGregor, R. Town, Nebraska Game & Parks Commission, General Biological, Inc., and Maynard Reece.

Wildlife Oasis Below Forest's Canopy

Settlers on the Illinois prairie found even the smallest clump of trees an oasis on the shadeless landscape. Because woodlands were special, generations of the same family were careful to preserve tracts of forest on their property.

To the south, west and northwest of the prairie, forest was abundant, totaling more than 14 million acres in 1809. The trees were so plentiful Illinoisans saw no harm in clearing as much timber as they could to make room for farmland. By 1900, 10 million acres of forest had been cleared. Now, less than 3.2 million acres of forest remain in Illinois. What is left has been preserved mainly by individual landowners, national forests, state parks, and forest preserve districts. Much of the remaining Illinois forest has survived because it is standing on ground too rocky, steep or wet to allow clearing.

Three-fourths of the Illinois forest is upland, comprised mainly of oak, hickory, mixed hardwoods and scrub hardwoods. The remainder is bottomland hardwoods and pin oak flats. Three United States forest regions cross into the state. The Eastern Deciduous Forest (trees that shed their leaves annually) is the largest, covering south central and southern Illinois, including the Shawnee National Forest. Trees in this forest are principally oak, tulip tree, sugar maple, American beech and black gum.

The Southeastern Coastal Plain Forest covers the lowlands of southern Illinois and is characterized by cypress, tupelo and Spanish oak.

The Northern Coniferous Forest (cone-bearing evergreens or shrubs) is present in a few scattered locations in northern Illinois and is characterized by tamarack, arbor vitae, Canada yew, white pine and white birches.

A forest is much more than the trees that comprise it. A forest is composed of several different parts, all of which form a complex ecosystem capable of providing food and shelter for plants and animals that reside there. The tallest reaches of a forest are the high branches of mature trees. These branches form a canopy over the forest, affording protection for plants and animals from wind and rain as well as shade for the plants that need it. The middle layer of a forest is the understory of smaller trees. Often dense with

foliage, these trees provide excellent cover and sources of food for wildlife. The forest ground cover is composed mainly of mosses, flowers and shrubs. This layer is the home and hunting ground for many species of insects, birds and mammals as well as some amphibians and reptiles.

Not all the vegetation of a forest is living. Dead trees, whether standing or lying on the ground, provide nesting cavities and food for a variety of plants and animals. Together, the many features of a forest offer a two dimensional habitat, stretching in many directions on the ground and climbing to great heights as well. This is why a forest can serve as a home for the raccoon who likes to criss-cross the forest floor in search of food as well as for the brown creeper, a tiny bird who spends all its time creeping up and down tall trees in search of tasty tidbits.

For most concerned people, the sheer beauty of forests is reward enough. Yet, forests heap on many more blessings, including wonderful opportunities for camping and hiking, and a vast array of paper products. However, forests must be managed as a balanced environment, where air, water and living conditions for all its dwellers are considered first. While quality must be maintained, so must size. Forest ecologists in Illinois are working to preserve forests in large blocks, so forest creatures that travel far and wide will not have to leave home to find their evening meal.

GOLDEN MOUSE

The golden mouse loves to spruce up its lovely orange-brown fur, taking great care to bathe, comb and style every hair on its body. On the other hand, the mouse is a slob as a housekeeper. Like a spoiled teenager, it loves to eat in bed and leaves bits of food scattered about its room. If its home gets too smelly and messy, it moves into another of its many nests until the first home airs out.

Golden mice live in many of the counties of southern Illinois. They set up housekeeping in woody areas and fields that are near water. Traveling at night to harvest seeds, berries and nuts, they must be extremely careful because even moonlight makes them easy for skunks, coyotes, foxes and owls to see. These mice are fast and skilled tree climbers, using their long tails to wind around twigs for balance.

The golden mouse nest is built into a tangle of vines, a briar bush or in the fork of a tree. The female uses her teeth and claws to finely shred every twig, weed or cloth that is used to build the nest. She also plugs the entrance to the nest with a ball of stuffing to protect the two to four babies from nest-robbing predators like shrews and snakes. If the mother has to move her family, the young attach themselves to her nipples with their mouths; their hold so strong that they can swing

GOLDEN MOUSE

from their mother as she travels. The young nurse up until their fifth week of life, a time when they are able to mate.

The golden mouse is one member of the white-footed mouse group. Scientists use these mice in experiments relating to epilepsy and other diseases. These experiments someday may lead to treatments and possibly even cures for these illnesses. Meanwhile, conservationists are working to keep the beautiful golden mouse in Illinois by providing it with good habitat sites.

SWAINSON'S WARBLER

The first sighting of a Swainson's warbler in Illinois was not recorded until the spring of 1878 near Mt. Carmel in Wabash county. These warblers still nest in several counties of southern Illinois. Distinguished by its cinnamon colored cap, Swainson's nest in deep, shaded bottomland woods where there is water, dense shrubs, vines, thickets and rotting timber. One plant almost always present in their homes--and probably very important to the Swainson's warbler--is giant cane.

The swampland food supply for the warblers consists of insects, spiders and the green worms found on water plants. The Swainson's nest is a rough scraggly mess of muddy leaves and usually cradles about three eggs.

Swainson's warblers live in Illinois from April to September, then take off on their fall migration to their winter homes in Cuba and Yucatan. During their summer stay, they are magnificent songsters, sitting atop a singing perch on the edge of a canebreak or singing from the ground, the performing Swainson's warbler is a unique sight—the warbler's head and bill pointed straight up, the beak opened and trembling, the entire body quaking as if totally absorbed in musical reverie.

A bird primarily of the southeastern United States, the Swainson's never has been a common warbler in most of its range. Plans to save its nesting habitat in Illinois call for managing good and healthy growths of giant cane;

controlling timber cutting at and near the nesting sites and limiting human interference at the nesting grounds.

LONG-EARED OWL

The long-eared owl is the quiet owl. So silent and reluctant to flush, in fact, that observers find it difficult to detect the owl in the dense evergreens where it usually roosts. When approached by man or any other potential danger, the owl creates its own special type of camouflage. It stretches its body from talon to head and pulls its feathers in tightly against the body. The slender, still object looks more like a broken branch than an owl.

An observer might never guess the owl was around if not for the owl pellets scattered over the needle carpeted forest floor. Pellets are indigestible parts of animals that the owl has eaten. The owl regurgitates these small pads of fur, feathers, and bones and they are a tell-tale clue of the owls presence.

The long-eared owl inhabits most parts of temperate North America. It is an uncommon to rare winter resident and a rare summer dweller in Illinois. The last successful state breeding record for a long-eared owl was in Clinton County in 1977.

The long-eared owl requires habitat with dense trees where it can hide throughout the day and hunt during the night. Using its long wings and tail to lightly power its slim body, the long-eared owl easily can thread its way through a tangled forest in search of prey--usually a small rodent.

The large nest of the long-eared owl is made of small sticks and needles, and is delicately lined with the downy feathers of the adult. The nest almost always is an old crow or squirrel nest left over from the previous breeding season.

Hatched with their eyes closed, the three to five downy covered young are at first slow and shy, but soon venture off the nest and into the branches even

LONG-EARED OWL

before they can fly. Owlets sitting on a tree branch surprised by an intruder will raise their wings, snap their bills loudly, and hiss and spit like angry house cats. If this doesn't scare the intruder away, they flop over on their backs and strike upwards with their talons. As a last resort, the owlets charge the intruder, screaming loudly on fiercely flapping wings.

The adult birds are equally as bold. No other bird defends its young with more outrageous performances and weird cries. If an owl is threatened on its nest, it glares with yellow eyes and spreads its feathers out into a protective fan surrounding its body and nest. Other times, an owl and its mate will threaten to attack an intruder with outreached talons while muttering a long line of owl profanity.

If the long-eared owl is to winter or breed in good numbers in this state again, the forests of Illinois need to be carefully managed.

GINSENG

The rough, scraggly root of ginseng has enticed mankind since before the dawn of recorded history. Its leathery root has been ground into medicines with reputed mystic powers. It has been touted for centuries by the Chinese as an aphrodisiac and a healer of the sick. The generic name for the plant, Panax, is derived from two Greek words which translate "all cure."

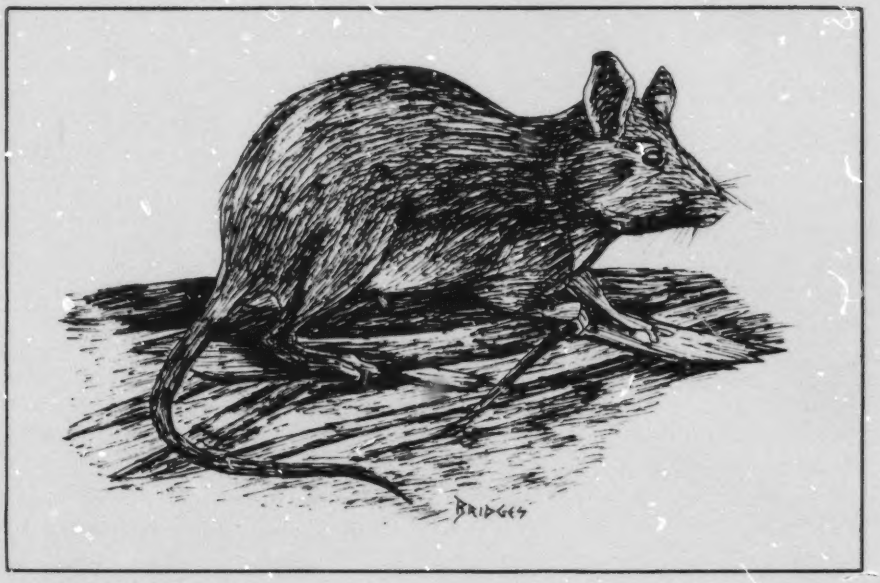
Since early colonial times, North American wild ginseng has been collected over much of the United States and exported to the Far East where demand for the plant still is high. In recent years, ginseng tea, shampoos, and beverages have become extremely popular in the United States. Even though the demand for ginseng is rising and prices soaring, the supply of wild ginseng plants is shrinking. In Illinois much of the shady hardwood forests that once hosted so much ginseng now is gone, and what remains is only sparingly stocked with the bright green plants.

Growing mostly in moist soil on ravines or down gentle slopes, the life cycle of ginseng involves many years. Once a ginseng seed falls to the forest floor, it lays dormant for 18 months to two years before it finally germinates in the spring of the year and begins to grow. During the following year, the plant grows to a height of only a couple of inches and its tiny leaves and stem die off with the first killing frost. The hearty underground root, however, survives through the winter to sprout a larger plant the next year. Upon the third or fourth year of its growth, the ginseng plant, now standing from eight to 15 inches high, opens its blossoms and bears its berries. Amidst a cluster of pale green blossoms, its berries are grouped, each one holding one to three seeds. In mid- to late August, the berries turn bright red, a sign that the seeds are matured. Soon the berries fall to the ground and are either picked apart by wildlife or left to rot. Once the berry pulp falls away, the seeds enter the soil.

The age of a ginseng plant can be determined by examining the root. When the foliage on a

plant dies each year, a scar is left on the plant's collar, between the stem and the root. Also, in the fall, the root shrinks, leaving a "growth" ring on the root. The age of the plant depends on how many scars or rings its root bears.

The exportation of ginseng from the United States is being carefully monitored under the terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Meanwhile, the Illinois Department of Conservation is cooperating with federal agencies to insure that commercial collection of ginseng does not outstrip our supply of this highly sought after plant.



EASTERN WOODRAT

EASTERN WOODRAT

The Eastern woodrat shares the nickname of "pack rat" with all other woodrats because it constantly is packing away objects. The woodrat is likely to drag home and stash broken pieces of china, mirrors, coins, kitchen utensils, eyeglasses, gum wrappers and cowchips.

Woodrats live in Illinois within the Shawnee National Forest. There are probably less than 100 woodrats left in protected woody areas along rocky bluffs. The woodrat is a victim of many of the creatures that share its habitat, including coyotes, foxes, skunks, bobcats, weasels, owls and snakes. When the woodrat is alarmed, it thumps one or both of its hind feet or its tail on the ground. The pattering on the leaves probably is meant to warn other woodrats of danger.

The woodrat patrols after dusk, using its whiskers like sensitive fingers to detect both treasures and food. The whiskers vibrate continuously and the nose never stops sniffing, especially when the woodrat is in reach of its dinner, which always is one of plants, seeds or nuts. Since it hates to come out in bad weather, the pack rat stores a large stash of food for rainy days.

The eastern woodrat builds its nest inside a crevice, ledge or bluff. It uses its nest, a six to 10 inch mass of soft grass, bark, cotton rags and other soft materials, until it dies. The woodrat cleverly builds a gridwork of twigs over the opening to confuse intruders. The house also boards a variety of other creatures including crickets, millipedes, and "wooly bear" caterpillars.

During the spring mating season, both the male and female woodrats rub fluid from a gland on their bellies onto the ground to attract each other. Once they meet, the male usually moves temporarily into the female's house. Even though he is a guest, the two often fight with one another. After the female gives birth and begins to nurse her one to four blind, deaf and naked young, she gives the male his eviction notice. Where woodrats are scarce, as in Illinois, the male might have to trek up to a half-mile to get home. Its normal walking range is only a 30 foot radius from its house.

Woodrats in Illinois have one thing in their favor. They are living in the best areas in the state for them. They need to live in the most southern zones because they cannot survive harsh winters. In fact, severe winters as long ago as 1912 and 1918 may have started the woodrat's decline in Illinois. The hard winters of 1976 through 1979 added to its plight. Biologists are working to help the woodrat by protecting areas where they live from human interference. But the chance of another cold winter always will threaten the pack rat.

SILVERBELL

Showing silvery white and hanging in clusters, the bell-shaped flowers of the silverbell give this elegant tree its name. Fairly common throughout the Carolinas and Great Smokey Mountains, silverbell grows in Illinois only in forested ravines near the Ohio River in Massac and Pulaski counties. The folk name for silverbell in these counties is "wahoo," meaning a shrub or small tree. Standing at a maximum of 30 feet in Illinois, this slender tree has reddish-brown bark overlaid with whitish stripes. Because of its showy flowers and bark, many home and commercial landscapers plant it for ornamental purposes.

During April and May, bees make regular visits to the delicate silverbell flowers. The blossom soon dies off, but a four-ridged brown fruit forms in its place. By

late summer and fall, the fruit either falls off or is eaten by squirrels. With a little luck, the seed inside the fruit is knocked loose and falls to the forest floor.

The forested areas in Illinois where silverbell lives are small and should be strictly protected to insure this handsome tree's presence in Illinois.

BACHMAN'S WARBLER

One of the rarest birds in North America, the yellow-faced, black-throated Bachman's warbler is now on the threshold of extinction.

Residing in a dense woodland swamp of South Carolina, the only known population of Bachman's warblers is clinging to life. Even though these warblers once nested in southeastern Missouri and occasionally visited the southern part of Illinois, there have been no state records for this species in over 30 years.

Bachman's warblers perch and feed from the tops of the tallest trees in their swampland homes. They do not flit from branch to branch like other warblers; they move rather slowly in comparison and patiently pick insects from leaves with great thoroughness. When a Bachman's warbler is frightened, it will issue a sharp alarm note, jerk its tail about and fly far and fast, making it practically impossible to follow the bird through the forest.

Populations of Bachman's warblers always have been dangerously low and these warblers have continually lost habitat to swamp timber cutting and agricultural drainage. Nonetheless, in case the Bachman's warbler makes a comeback, and once again extends its range toward Illinois, biologists recommend preserving bottomland forests to assure this warbler a suitable habitat.

MISSISSIPPI KITE

The Mississippi kite can catch a flying insect after diving hundreds of feet through the sky. The sure-footed bird can then tuck its prey under its tail or carefully pull off the wings and gobble up the grub, all without missing a flight beat.

Mississippi kites arrive in south-central United States in the spring, after wintering in South America. The kites that settle in southern Illinois choose dense forests for nesting. During the courtship, nest-building and early egg incubation, the male kite is known to pamper the female by bringing her insects and tearing off the wings for her. Both mates are skilled carpenters and they tear branches and twigs loose from trees with their beaks and talons. These materials are used to build a nest high in a sycamore, sweetgum or cottonwood tree. The kites exchange two-hour shifts sitting on the eggs. When one bird comes to relieve the other, it brings a leafy branch and tears off the leaves to pad around the eggs before taking its place atop the nest.

Young kites often stand at the edge of the nest and test their wings by spreading them over and over. The adults feed the young birds by tearing insects and small reptiles into bite size nuggets.

Mississippi kites leave their forest homes to hunt over open or abandoned fields. Between morning and evening hunting activities, the kites perch for hours on a dead limb and occupy themselves by preening and basking in the sun.

One early ornothologist has called the Mississippi kite "the gem of the sky." To keep this bird in Illinois, large tracts of bottomland forests near swamps and major river systems need to be preserved.

WHORLED POGONIA

Like a pinwheel, a whorl of green leaves crown the stem of whorled pogonia. Resembling no

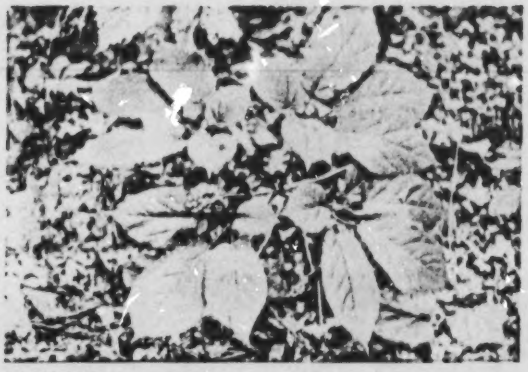
BARN OWL

RED-SHOULDERED HAWK (Adult and Immature)

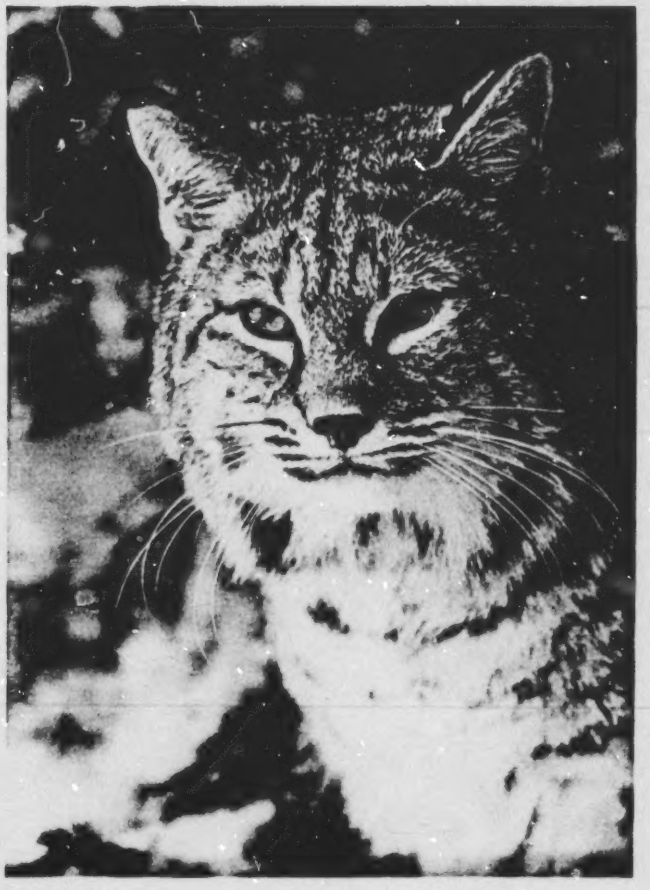
BARN OWLS

Precious Living Jewels From The Forest

COOPER'S HAWK



GINSENG



BOBCAT

other orchid, long slender sepals dangle like shoestrings from the main petals of its purple flower.

Whorled pogonia is common in the southeastern United States. As far north as Illinois, the orchid is extremely rare. Whorled pogonia was not discovered in Illinois until 1967, growing in ravines and along small stream beds, three good-sized populations now are known to exist in the Shawnee National Forest.

Unlike most orchids, whorled pogonia is a colonial plant. An underground network of stems send up groups of pogonias each spring. By late April and May, some of the plants are bursting with open flowers. Most of the plants, however, depending on the severity of the last winter, develop a whorl of leaves but fail to show a flower.

Pollination is carried out by insects, mostly bees that are attracted to the showy flowers. Following pollination, the ovary of the flower grows into a brittle brown fruit that looks like a drawn string purse. Fully matured by late summer, the fruit opens at the top and seeds scatter with the wind for miles. After the first killing frost, the plant ceases activity and melts into the winter decay of the forest.

The natural ecosystems in Illinois that support whorled pogonia should be protected from erosion and flooding. The orchids should be carefully guarded against collection by commercial florists because their numbers are too small to withstand the harvest.

BOBCAT

The bobcat brings to mind rich images of the early 1800's when pioneers settled the raw woodlands and prairies of Illinois. The bobcat was common and at the top of its food chain. There were many small birds and mammals for the bobcat to hunt, but none that threatened it in return. But the powerful cat frightened the settlers. They agreed the bobcat was a "varmint" that should be destroyed.

Illinoisans levied guns and traps at the bobcat without regard for the devastating numbers of the bobcat that were being killed. Many years passed before it was realized that hunting of the bobcat should be carefully regulated. Unfortunately much of the misunderstanding about the bobcat persists today. The bobcat is not a threat to man; all the big cat wants is to be left alone--free to hunt and to mate.

The three foot long, 15 to 30 pound bobcat stalks its prey at night. Its tremendous strength, coupled with its razor sharp claws and dagger-like teeth, guarantee a low failure rate once the cat has scouted out a victim, usually a small bird or rabbit. Anyone who has seen a housecat pounce on a mouse can imagine the stealthy leap of a bobcat onto a rabbit.

The bobcat also is able to take big game. Leaping from a ledge or from behind onto the back of an unsuspecting deer, the cat can bring it down, sometimes only after riding on the deer's back through the forest, biting and clawing into its neck all the while. More commonly the bobcat kills weak fawns, and old and dying deer, and does not shy away from eating carrion.

Deep inside a cave, a rocky crevice or a hollowed-out log, the bobcat makes its den. To this cozy hideout the adult cat brings live prey so the bobkittens can learn to slay their own food. The bobcat occasionally will take time to wrestle with the kittens who love to play inside the den.

The bobcat is thought to occur most commonly in the southern counties of Illinois, but has been found sporadically in almost every other area of the state. No matter the location, the bobcat is extremely scarce in Illinois. Because this species is so good at avoiding people, no one knows exactly how many bobcats still roam its natural range, which includes most of the United States-excepting the southeastern states--and Canada and central Mexico.

The bobcat needs large woodland areas that are broken by protected river bottoms and open brushy areas and hollows if it is to rebuild a healthy population in Illinois. Meanwhile, we can help the bobcat by rejecting its long standing reputation as a "varmint" and continuing to protect it as a beautiful wild native of Illinois.

TAMARACK

A native American member of the pine family, tamarack is a medium to large tree, standing up to 100 feet tall. Supported by a trunk with a diameter of 1½ feet, its spiraling crown of branches forms a lofty peak like that of a Christmas tree.

Tamarack grows in bogs and swamps across much of Canada and southward into the Great Lakes states. In Illinois, the tree now lives only in Lake and McHenry counties. Once more common in Iliinois, tamarack has suffered from a combination of crippling factors. Populations have been damaged when their watery homes were drained or flooded. Tamarack also faces grave competition from an introduced shrub called glossy buckthorn. Growing in dense thickets around the ankles of tamarack, glossy buckthorn makes it impossible for the tree to lay seeds on the forest floor. Tamarack also has suffered heavy losses at the jaws of bark beetles and one stand was destroyed by fire.

Before the frozen terrain of northeastern Illinois has a chance to thaw each spring, the needles of tamarack already are peeking out. By May, oblong yellow buds appear on the side of twigs and branches. These are the male cones laden with pollen. The tiny female cones are red or greenish. When fertilized by pollen, female cones and the seeds inside them begin to mature. By autumn, the cones are chestnut brown and bursting with ripened seeds. Seeds are carried out of the cones on

small wooden scales that catch the wind and sail through the forest.

Painting a beautiful collage of colors for the fall, the needles of tamarack turn golden yellow against the green of the forest. One of the few conifers to shed its leaves, the needles soon drop to the ground. Throughout winter, the fallen seeds lay dormant on the forest floor. They must be exposed to the cold weather before they can germinate in the spring.

About half of the stands of tamarack in Illinois are protected in Illinois Nature Preserves and in a county forest preserve. The remaining stands are on private property. Managers are working with these landowners to assure that this tall tree prevails as a beautiful and valuable feature in the bogs and wetlands of northern Illinois.

BARN OWL

Nature had invented a better mouse trap long before mankind set his mind to the task. It's name is the barn owl. Catching mice comes easy for the barn owl, which often is called a 'cat with wings.'

Found in most parts of North America, barn owls have become increasingly rare in Illinois over the last 10 or 20 years. When small farms were a common feature on the Illinois landscape, barn owls were plentiful and they lived in harmony with the farmer. The old wooden barn, the barnyard and the nearby meadow gave the owl and its family a home and places to hunt. In turn, the owl saved the farmer heavy pest control costs by killing hundreds of rats, mice and insects each breeding season. The farmer was glad to have this "flying mousetrap" that can kill more mice in one night than a dozen cats.

As farming changed, the barn owl failed to keep in step. Small family farms became consolidated, and almost overnight, old barns gave way to tightly-sealed, foreboding metal fortresses, small meadows were plowed under for vast grain fields and tracts of timber were sheared to make room for yet more cropland. The barn owl was left without a home or hunting grounds. The farmer no longer looked to the owl for rodent control, employing pesticides instead. The pesticides worked so well that the food supply of the barn owl shrank and the animals it did find to eat often were laced with deadly chemicals.

'The Barn Owl: A Cat With Wirgs'

Lack of food is a problem because barn owls always are hungry. Owlets in the nest can eat as much as their own weight in food each night. To feed such ravenous youngsters, adult owls embark on hunting trips as soon as night falls. With keen eyesight, at least 35 times and probably 100 times as acute as man's, and a remarkable sense of hearing, the barn owl can chase its prey through a dense forest even on a moonless, overcast night. Its swift approach usually is never heard by the victim because the barn owl's feathers are sheathed with a velvety pile of down, muffling sound to less than a whisper.

The recovery plan for the barn owl in Illinois calls for protecting its habitat and potential nesting sites from disturbance. Illinoisans can help by placing manmade nesting boxes in the top of barns, silos or any other large building where grain spills and rodents are likely to gather. The Illinois Department of Conservation would appreciate any reports of barn owl nests in the state. Look for the nests and the white-downy young anytime during the year, but usually during the spring and summer.

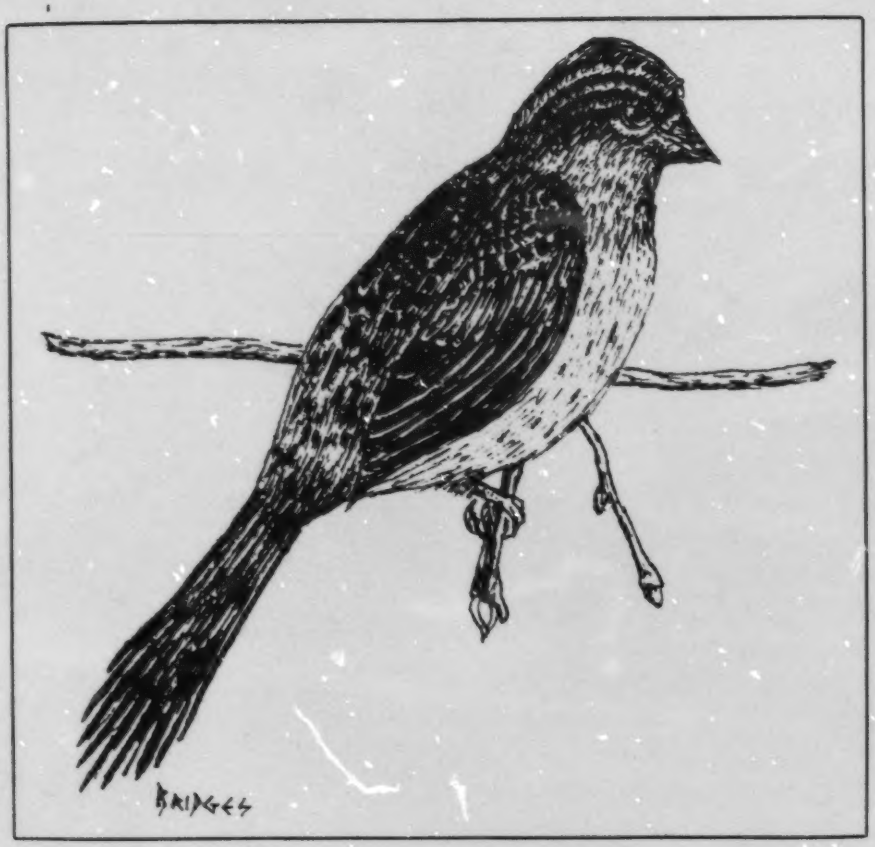
WHITE BASSWOOD

Rising up to 70 feet in height, white basswood is crowned by widely spreading branches and brown bark cut by deep scaly rows, and small greenish yellow clusters of flowers. The hairy white coating underneath the heart-shaped leaves give white basswood its name and separate it from its cousin, the American basswood.

White basswood grows fairly commonly in the Appalachian Mountains. From those highlands, the range of white basswood snakes along the Ohio River Valley through the southern tips of Ohio, Indiana and Illinois and finally settles into the Ozark Mountains of Missouri. The three stands of white basswood in southern Illinois are like markers along this trail. Since these Illinois trees are outside the species' high ground range, they have had a rough time of survival in Illinois. But the Illinois trees have found their most favorable homes in moist ravines along the Ohio River bluffs and in the Shawnee Hills.

Sometime in June and July, the fragrant five-petaled flowers of white basswood open up in shaded forests. Bees pollinate the sweetly nectared flowers and members of the basswood family often are called "bee trees." By mid-summer, the woody nutlets of fruits are ripening and are fertile with seeds. About the size of a large pea, the fruit has turned from green to brown as it matured. Sometimes the fruits cling to the branches throughout the following winter. More often though, they are eaten by squirrels or are blown to the ground. In either case, the seeds are broken loose and scattered to the forest floor.

Of the three populations of white basswood in Illinois, two are protected within Illinois Nature Preserves, although one consists of only a single tree. The third population is in the Shawnee National Forest. Managers are handicapped in protecting this



BACHMAN'S SPARROW

tree because it is living in an environment very different from that of its natural range. The main efforts will involve protecting the habitat where the trees now stand.

BACHMAN'S SPARROW

Deep within the virgin pine forests of the old south, one of the sweetest of all bird songs faithfully graced every summer morning and falling twilight. But try as they might, observers like John James Audubon and his friend and naturalist, John Bachman, could catch but a fleeting glimpse of the vocalist. Even today, Bachman's sparrow is noted as one of the world's most delightful choristers, and a bird whose life story is shrouded in secrecy.

Bachman's sparrows thinned out in the southeast when the vast pine forests were sheared down after the 1890's. About the same time, Bachman's sparrows living along the northern edge of their range in Illinois were being threatened as grasslands and forests were being cleared for farmland. After once nesting occasionally in northern and central Illinois, and more commonly in southern Illinois, this reddish sparrow distinguished by its purplish back, now nests only rarely in the southern reaches of the state.

Bachman's sparrows nest in abandoned fields that have grown up in goldenrod, asters, grasses and shrubs. The nest is built on the ground and is well concealed by low bushes. Both parents feed the young the standard Bachman's sparrow diet of seeds and insects. The adults do everything they can to keep the exact location of the nest a mystery. Instead of flying directly to the nest, an adult lands some distance from it and then sneaks on foot through tangled underbrush to the nest.

If an intruder comes near the nest, the adult creeps away from the nest in the same manner, popping up from under a bush just long enough to catch the attention of the intruder. Then the bird fakes injury—a crafty ploy designed to get the intruder to follow what it believes to be wounded, easy prey rather than continue looking for the nest. When the bird has enticed the intruder far away from the nest, it abandons its act and flies away.

The sweet song of Bachman's sparrow is arranged in a series of melodious phrases that are chorused by perfectly pitched trills. The rich song has up to 12 phrases but lasts for only two to three seconds. The birds sing only during the summer. When fall approaches the birds, especially the ones that summer in northern areas like Illinois and Indiana, move down into the southern states and live out the winter in silence and warm weather.

The Bachman's sparrow needs a good supply of abandoned fields close to trees to continue nesting in Illinois. Biologists recommend a controlled program of burning to maintain and develop the most suitable plant growth on the few abandoned fields that are left for this "hermit" sparrow.

YELLOWWOOD

The wood of the yellowwood tree is tightly grained, hard and yellow, and its lumber is ground up to make a clear yellow dye. Smooth, gray and lean, its trunk supports a wide umbrella of branches. Reaching 40 to 60 feet in height, yellowwood stands bare during winter, but puts on a handsome garb of green leaves and delicate white flowers in spring.

Deep within the Cumberland Mountains of eastern Kentucky, yellowwood has survived for millions of years. Standing on lofty peaks, yellowwood and other vegetation have escaped the glaciers that repeatedly covered the lower elevations of North America, including Illinois. Following the retreat of these glaciers yellowwood migrated down from the mountains, along the Tennessee River finally to join the Ohio River at the tip of southern Illinois. Rising out of ravines and along moist wooded slopes of the Shawnee National Forest, 78 yellowwood trees now are growing

in Illinois. Many of the trees appear to be sick and near life's end. However, many of the feeble trees are producing healthy sprouts and forest ecologists hope that this seemingly poor condition may just be a natural part of yellowwood's growing cycle.

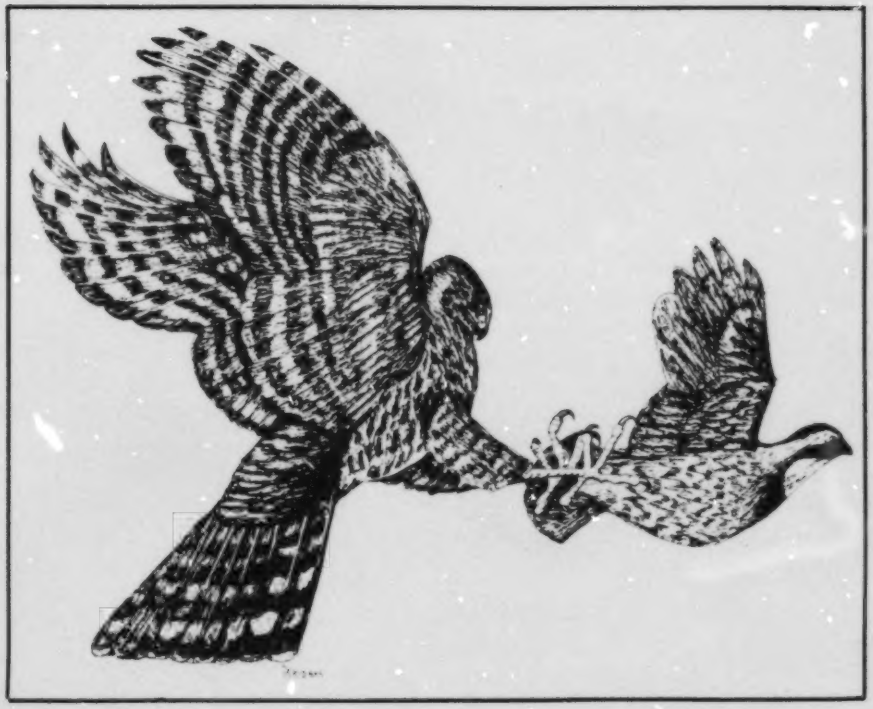
Fragrant flowers burst forth on the thin sprigs of yellowwood each June. Attracted by the showy white blossoms, insects rush into the petals' reaching arms. In hopping about the inside of the flower, the insects rub pollen from the stamen, or male part of the flower, onto the stigma, a female part of the flower. As summer wears on, the blossoms break off leaving the ovary of the flower behind. The ovary grows into a tough-skinned fruit which looks very much like a green bean. Fully matured in August or September, the fruit falls to the ground. Birds and rodents pluck the stored seeds from within the fruit and carry them about the forest.

Forest ecologists want to learn more about the life requirements of yellowwood. Efforts already are underway to protect the fertile valleys, slopes and bluffs where the trees now grow. Meanwhile, new seedlings are coming up and if the adult trees can manage to hold on, yellowwood is likely to remain a keepsake from the past in the Shawnee National Forest.

COOPER'S HAWK

The Cooper's hawk has a way of riding belly up and feet first to snare its prey. Gaining on a bird or squirrel, the Cooper's hawk assumes the position for attack. Bowing its head, it brakes its terrific speed by dropping its spread tail and hanging back its rounded wings. Closing in, the hawk pushes its legs so far forward its talons tag the victim long before the weight of the hawk forces the talons deep into the victim's flesh.

Success at hunting has brought the Cooper's hawk both reward and tragedy. The story began a long time ago when small barnyards populated with free-roaming chickens were a common feature on the American landscape. Known to kill as many as 12 chickens in a single day, the Cooper's hawk was a notorious outlaw to the farmer. A contract went out against the then common "chicken hawk" and large numbers were shot on sight.



COOPER'S HAWK

In truth, the Cooper's hawk kills more fair game from its own habitat than it takes from rural feedlots. One reason for the Cooper's hawk's decline over much of North America is the reduction of available prey. As more natural areas vanished, fewer small birds and mammals remained. As a result, larger predators like the Cooper's hawk have starved off. Dwindling food supplies coupled with the presence of pesticides in the environment both are causes for the plight of the Cooper's hawk in Illinois.

After once nesting commonly over much of Illinois, this hawk only rarely raises its young in the southern and northern parts of the state. The Cooper's hawk takes up temporary residence in central and northern Illinois during times of migration and occasionally during the winter.

Cooper's hawks settle into hardwood forests upon the finish of their spring migrations. They prefer area clearings or meadows where they can spot and chase prey such as quail. Their nest usually is located some 40 to 50 feet above the ground in the upright crotch of a tall tree. After three to six eggs are laid, the parents pad shredded bits of bark around the eggs, and await the 24-day incubation period.

First covered in snowy down and later with patches of bone-brown feathers, the young hawks have a great appetite. At the age of six weeks, one youngster can devour the equivalent of eight house sparrows per day. Once the young hawks leave the nest, they often group together on fallen logs and carry on a conversation of shrill whistles. They take turns flapping their wings, practicing for the time when they will be the superb flyers their parents are.

The recovery plan for Cooper's hawk in Illinois calls for

carefully managing forest areas and protecting known nesting sites from disturbances. Removal of harmful pesticides from the environment is also critical for the survival of the species.

SHORTLEAF PINE

Tall, wide-trunked and reddish-barked, the shortleaf pine is a benefit to animals of the forest. When food is scarce, white-tailed deer feed on the tender shoots of young trees and turkeys occasionally feast on the small seeds that fall from the cones. Scattered thickets of smaller pines provide excellent cover for a variety of wildlife.

A common tree in the southeastern United States, shortleaf pine is harvested and used for building materials and pulpwood. Shortleaf also grows abundantly in the Ozark Hills of Arkansas and Missouri. Long before Illinois was settled, seeds from these Missouri trees crossed the Mississippi River and founded a native stock of shortleaf pines in the prairie state. The great, towering trees have not had an easy time surviving in Illinois, where the climate is much harsher and colder than in its southern range.

During March and April shortleaf pine prepares to sow seeds for the future. Male cones, shaped like small purple spikes are busy making pollen. The forest floor soon is carpeted with pollen and nearby ponds and lakes are likewise blanketed with the chalky yellow powder. Meanwhile, the tiny rosy-pink female cones are holding a cargo of future seeds. After the wind carries pollen to these seeds, the female cones begin to grow into full sized cones. The cones will not mature and bear out their seeds until the following fall.

Although the pines once were more plentiful in Illinois, only two stands of shortleaf remain in the southwestern nook of the state. Fortunately, both native stands of shortleaf pine in Illinois are in protected sites. One stand is in an Illinois Nature Preserve, and a large population grows in the Shawnee National Forest.

RED-SHOULDERED HAWK

The red-shouldered hawk is seldom seen outside of southern Illinois today. In times of settlement, however, this medium sized hawk was the most common hawk in the Illinois forest.

The loss of many acres of forest across the eastern United States is the primary reason why red-shouldered hawk populations have declined throughout the species natural range. In Illinois, the red-shouldered is a fairly common year-round resident only in the southern counties where there is still good-sized forests.

Elsewhere in the state, this hawk is rare. A small number of red-shouldered hawks nest in northeastern Illinois and some cross northern and central Illinois during migration. The red-shouldered hawk always seeks out lowland woods where there is water. A swamp, bog or river bottom makes for a good hunting ground for rats, mice, snakes, frogs and fish.

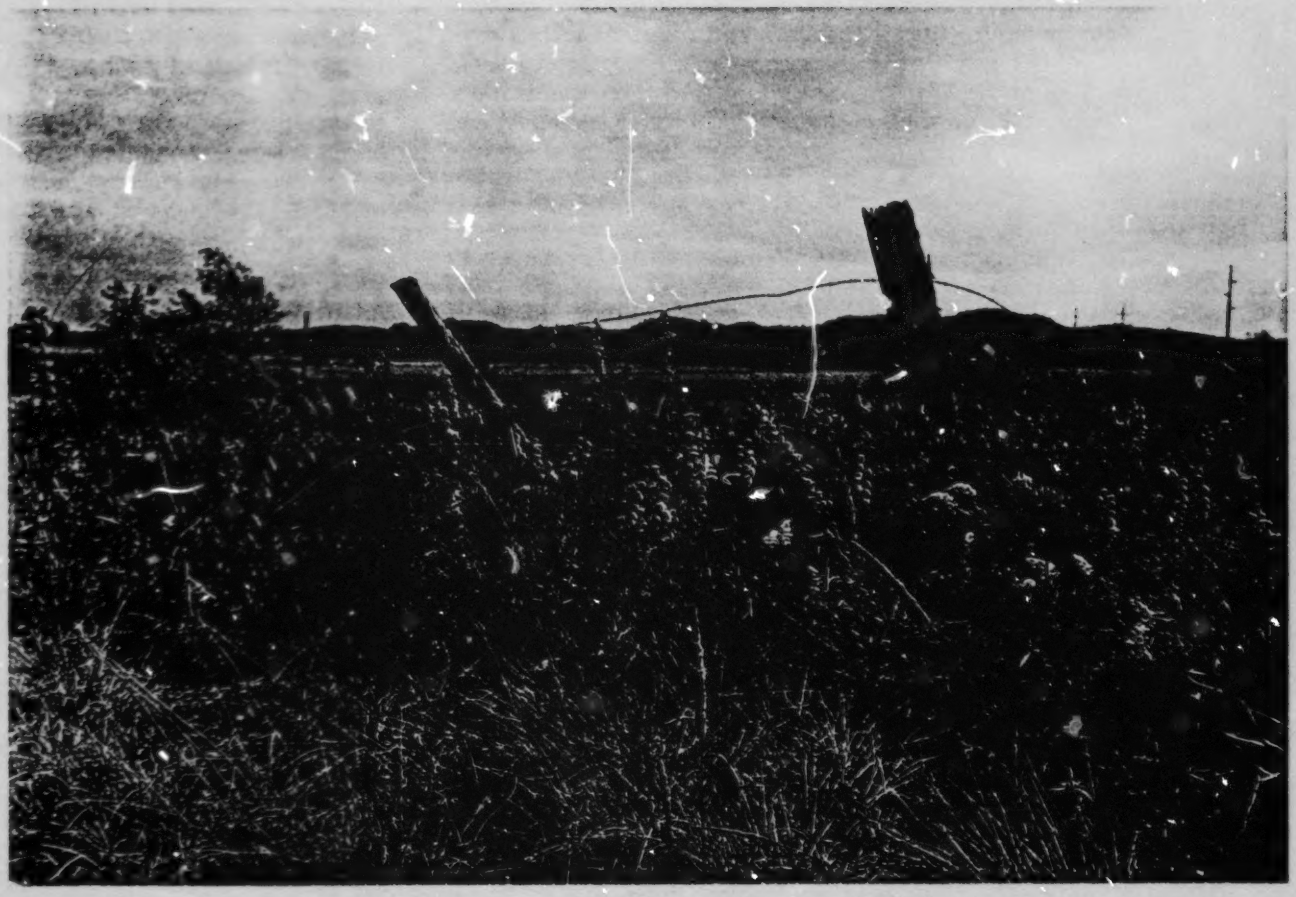
Red-shouldered hawks mate for life and return to the same nesting area each March. Carrying out a dramatic courtship routine, the birds climb up to 1,000 feet in the air, circle broadly and cry out a shrill "kee-ah, kee-ah." With wings and tail broadly spread, the birds swing toward each other and then quickly pull away. If one mate falls low, the other gives chase in a thrilling nose dive. Lunging lower and lower, the birds finally brake and sweep into the branches of a tree for mating.

Securing a nest is the work of both mates. They prefer to use an old nest. If one is available they lay a fresh sprig of greenery in its inner cup, to mark the nest as theirs. If a new nest is built, the hawks locate a strong fork in a tall tree, usually an elm, birch, maple or beech. The large nest is built of sticks and is lined with soft mosses and lichens.

During the 28 days the two to three eggs take to hatch, the two mates share nest-sitting duties. While one broods, the other hunts. Starting from a high perch where the hawk can spy creatures from afar, it swoops low over the trees and dives through the branches to snare its prey. Frequently, one mate will bring a fresh catch to its partner. Shredding a mouse or snake into bite-size pieces, the dining bird slowly eats the meal without stirring off the eggs.

Covered with silky white to buffy colored down, the young hawks spend their days in the nest in constant activity–standing up, fluttering about, preening their growing plumage and frequently screaming. After being fed by the adults the youngsters lay down and doze in the sun. To strengthen their muscles for flight, the young birds stand at the edge of the nest and flap their wings. Finally at about six weeks of age, the fully-feathered birds hop out of the nest onto the branches. Soon they are fluttering through the woods, but they stay with their parents until they have learned to fend for themselves, usually in autumn. At this time, many of the Illinois birds, especially those nesting in the northeastern counties, rise to the skies, swerve eastward, and follow the long chain of the Appalachian mountains southward to warmer wintering grounds.

The recovery plan for the red-shouldered hawk in Illinois is to protect lowland tracts of forest, especially where there is a good supply of large nesting trees.



Priceless Prairie Plants, Animals

There is precious little prairie left in the Prairie State. Corn and soybean fields that checkerboard the Illinois landscape certainly do not qualify as prairie simply because they are wide, flat and treeless. True prairies, except for a few patches scattered here and there, are things of the past in Illinois.

When the first European settlers came to the middle parts of North America, they found grasslands that ranged from Indiana westward to the Rockies, and from Texas northward to Canada.

They borrowed the French word "prairie," meaning meadow, to christen the new lands. Dominated by grasses, the prairie was dotted by broad-leaved plants and colorful wildflowers. Countless herds of buffalo, elk and antelope roamed its ranges, and so many prairie chickens boomed each spring that the bold, sweet songs of the meadowlark, dickcissel and bobolink practically were muted.

During some summers, the prairies burned spectacularly with fires so bright that one settler wrote that you could read fine print while standing 1 1/2 miles from the fire. But fire is the prairies' friend, ridding it from time to time of trees and shrubs while leaving the roots of prairie grasses and flowers cool and safe under the ground ready to sprout back up with the next spring.

Illinois was on the eastern border of this vast grassland. More than two-thirds of the state was under grass, the remainder in forest. Between the grassy areas and the forest lay a special type of habitat known as savannah. Supported by a good bed of grass and sprinkled lightly with trees, savannahs offered a habitat for prairie plants that required shade. Savannahs offered a transition zone for those animal species that alternate between open areas and forests for hunting and nesting. Savannah type habitats still are found in Illinois, usually beside prairie or near where prairie once ranged.

In the old days, there were three types of prairie in Illinois. Today, we have remnants of each of these prairie varieties. The largest, which covered the central part of the state was the tall-grass prairie. On this prairie, grasses like big bluestem and Indian grass reached heights of seven feet or more during the summer.

Sand prairies, located in the sand deposits of the Illinois and Mississippi rivers, contained grasses and broad-leaved plants that were adapted especially to living in dry conditions. Hill prairies, which occupied the south and west facing bluffs of major streams and rivers, contained mid-sized grasses such as little bluestem and side-oats gramma which reach heights of two to three feet.

Virgin prairie of Illinois was destined to change, however. Beneath all the grasses and flowers, lay the rich, dark soil that would become the best in the world for cropland. At first, the settlers were at a loss to break the prairie with their wooden plows, but with the invention of the steel plow in 1850, they took to the prairie with fervor, determined to change it into farmland that would pay a good dividend. Once they succeeded, they were anxious to protect their land and developed ways to prevent grass fires. With the absence of fire, most of the few prairies that had somehow escaped cultivation, eventually grew up in trees and brush. As a result the great Illinois prairie has shrank to its present size of a few thousand acres sprinkled about the state. Fortunately, a good amount of the remaining prairie is protected in Illinois Nature Preserves, but more than half of it remains in tiny parcels--lining old railroad beds, inhabiting hillsides too steep to mow and finding life in forgotten pioneer cemeteries.

For the plants and animals that once thrived on the Illinois prairie, the loss of most of their habitat has had varied effects. The prairie chicken clings to life on prairie sanctuaries managed for its benefit. The prairie white-fringed orchid struggles precariously on scattered patches of prairie and the wild bison has disappeared from the prairie state forever. However, some species have been able to adjust to the loss of the prairie by moving to other "open field" habitats, such as pastures, alfalfa and clover fields, and old fields, which partially substitute for prairie.

Pastures, if not overgrazed, afford habitat for a variety of insects, amphibians, reptiles, mammals and birds. Alfalfa, clover and other forage crops provide seeds and other plant materials for food, as well as good wildlife cover during the growing season. Usually, old fields eventually grow up in trees and brush, but before they become too heavily forested they can be good habitat for grassland plants and animals. Old fields also can be restored to prairie.

While a great many people are working to restore prairie in Illinois, there is also a significant prairie preservation movement afoot. Both private and public organizations are working to preserve the prairies that we have left to ensure that future Illinoisans will be able to see the landscape, plants and animals that play such an important part in our natural heritage.

LOGGERHEAD SHRIKE

Like an eagle or hawk the loggerhead shrike has the power to kill birds, mice and snakes. But unlike these other birds of prey, the shrike has no sharp talons to held down its food for easy feeding. To make up for this, the shrike sticks the body of its victim on a thorn or fence barb and tears away the flesh with its beak. The shrike likes to pack away a pantry of food. A thorn bush sporting several dead and hanging birds, or a fence line decorated with as many as 15 snakes is not an unusual sight. Because of these habits, the shrike often is called the 'butcherbird.'

Loggerhead shrikes are known over most of the United States. Formerly, shrikes lived throughout Illinois, but their favored habitat along hedgerows has diminished in northern and central areas. Shrikes now are year-round residents only in the southern third of the state and in parts of western Illinois.

Nest building in osage orange hedgerows, red cedars and rose

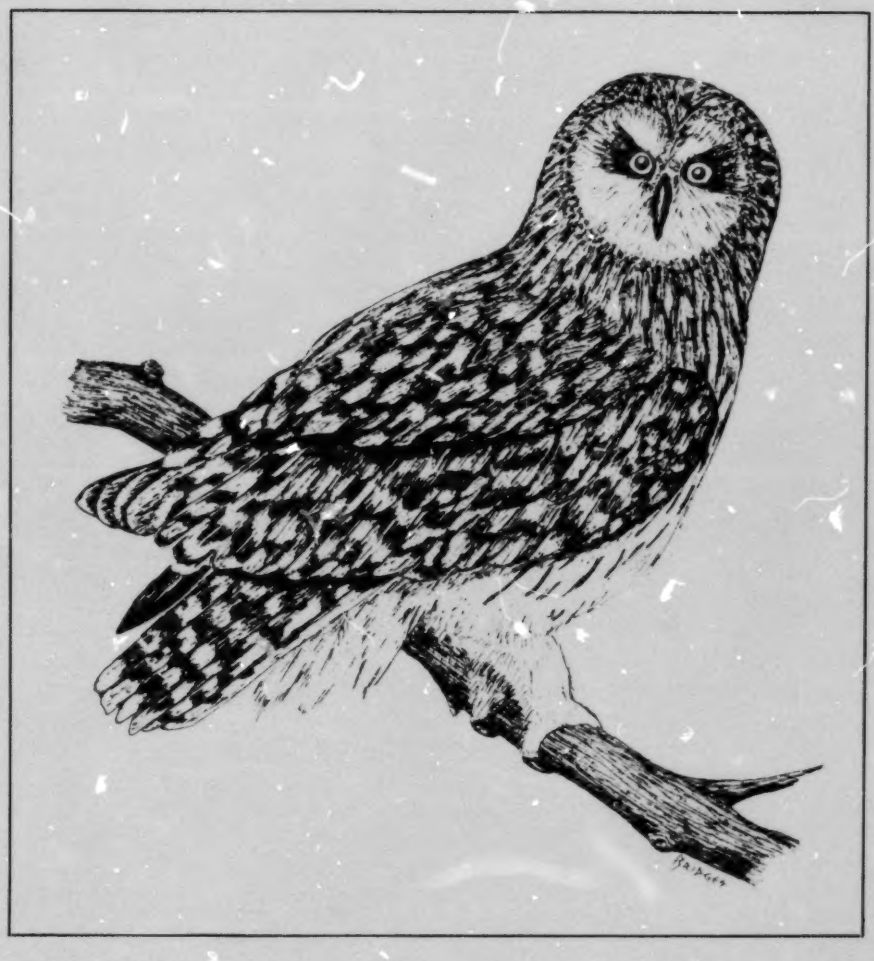
LOGGERHEAD SHRIKE

bushes begins in March. Both adults are skilled architects and their nest of thick twigs lined with hair, rootlets or rags lasts well after the brood of four to six young are hatched in April. During the breeding season, the male is very attentive to the female, bringing her choice bits of food, driving away crows and bluejays from the nest, and taking his turn sitting on the eggs.

Loggerheads like to perch on high branches, fence posts and telephone wires where they can keep an eye on the open country where they hunt. Their eyesight is extraordinary even for a bird. They have been known to lift off a perch and speed at 28 mph for 50 to 70 yards and snag a grasshopper.

The loggerhead shares a bad reputation with larger birds of prey for killing songbirds. However, birds make up only a small part of the loggerhead's diet. Furthermore, shrikes have been helpful to farmers by eating mice and rats that ransack grain bins.

The loggerhead shrike is another bird that has suffered from the effects of pesticides like DDT. Among other things, DDT affects the motor patterns of young shrikes causing them to be less skilled in killing prey. In addition to carefully controlling the amount of pesticides allowed to enter the environment, recovery efforts for the loggerhead shrike in Illinois call for managing areas for hedgerow and thorny bush growths.



SHORT-EARED OWL

SHORT-EARED OWL

The short-eared owl inhabits every continent except Australia. The short-eared migrates through Illinois during the spring and fall, with a very small number of them spending the summer in central and northern Illinois, where they reside in marshy and fallow fields.

A male short-eared owl flies slowly on silent, flapping wings toward his destination. Reaching 200 to 300 feet above the ground, the owls takes an easy curve and whistles out a long series of "toot-toot-toot." Below, hidden in grasses, a female short-eared owl is watching and listening. To impress her, the flying owl turns tail up and plummets downward. Not intending to fall far, the owl quickly swoops back upwards, braking his dive by pulling his wings before him and clapping them together. From the ground, the wing-clapping sounds like the fluttering of a small flag in the wind, and looks as if the male is applauding his own aerial courtship display.

The nest of the short-eared owl is a slight depression in a grassy field, usually girdled by weeds and an occasional feather. The female lays four to nine eggs over a period of two weeks, beginning incubation when the first egg is laid. As a result, the oldest owlet is sometimes up to two weeks older than the youngest. During times of famine, the oldest sometimes will devour its smaller sibling.

At the age of two to three weeks, the owlets begin to stray off the nest and hide in tall grasses. Their cinnamon colored down usually protects them from discovery, but if they are detected, they roll over on their backs and "play possum." If this doesn't work they continue to lay on their backs and strike upward with their talons. To protect their nest, the adults also play-act. If their nest is threatened by an intruder, one adult will rise to the air and drop and tumble toward the ground repeatedly, as if it has just been shot. The owls hope to convince the intruder to follow a seemingly wounded and easy prey,

rather than continue its approach toward the exposed nest.

Short-eared owls hunt during the day and night, but most commonly during the twilight hours of dawn and dusk. They hunt in groups in the winter and singly in the summer. The owls use two different techniques to share their chief quarry, meadow voles. One approach is called "hawking" because the owl patrols low over the ground. Suddenly, without warning, it drops its talons into the neck or back of a mouse which is swallowed immediately. Other times, the owl waits in camouflage, its brown colors blending into the stubble of a field. In both cases, the owl usually turns his big rounded head slowly like a radar antenna to hear the slightest movement. Biologists believe the exceptionally large ear openings on the short-eared owl help it to hear the rustle of a mouse hidden in thick vegetation long before it can see the prey.

Outside of the raccoon, which eats its eggs and young, the short-eared owl has few natural enemies. Recovery efforts for the short-eared in Illinois will center around protecting the owl from senseless shooting and preserving large tracts of grass and marsh habitats.

WHITE-TAILED JACKRABBIT

During the 1940s and 1950s, white-tailed jackrabbits were a common sight amid the sand prairies of the Savanna Army Depot in Jo Daviess County. Nowadays, jacks are rarely seen there and biologists fear that the only known population of white-tailed jackrabbits in Illinois is in grave danger.

The white-tailed jackrabbit has to jump for its life every day. Dodging, spinning, bounding 20 feet at a time, and speeding up to 45 mph, the jackrabbit often gives its pursuer the slip. Even when not being chased, the jackrabbit makes every fourth or fifth jump higher so it can scout for danger.

Disruption of the natural habitat has contributed more to the jackrabbit's backslide than attack from other animals and disease. These factors have cut the hare's numbers drastically even in the states where it is most common, Wisconsin, Minnesota and Iowa.

The jackrabbit feeds on grasses, clover, and some herbs and grains, but during the winter, it will resort to eating buds, bark, and twigs of woody plants. When the jackrabbit rests, it tucks its 19-20 inch, seven pound body into a stand of vegetation or in the sand. These protective molds are called "forms." Since the jackrabbit is a hare and not a rabbit, its young are not born naked or blind but fully furred and wide-eyed, usually in June.

The jackrabbit gets its name from the jackass because they both have long, floppy ears. Hopefully the jackrabbit will prove as stubborn as its namesake in surviving at the Savanna Army Dept. It can be helped by carefully deciding which maintenance policies at the site involving mowing and construction are best designed to restore foraging and cover areas for the jack.

PRAIRIE ROSE GENTIAN

A rare treat for the early settlers to Illinois was the prairie rose gentian, waving gently on thin-leaved stems, seeming to blush red from its hiding place in the tall, golden grasses of summer.

Along with the native prairie, prairie rose gentian has all but disappeared from the prairie state. Only one population is left in a prairie remnant that is kept free from disturbance alongside an abandoned railroad bed. There may be more prairie rose in southern Illinois, but no one has yet discovered it.

Little is known about the natural history of this wildflower. It stands from six to 16 inches high. In July of its first year, the plant comes up, puts on green leaves but does not bloom before

WHITE-TAILED JACKRABBIT

it dies in the heat of late summer. In its second year, it comes up and blooms a glorious display of pastel pink-red petals encircling a cup of yellow stamens. During this second summer, it also throws down its seeds. It is important for the second year plant to bear its seeds before it dies because it will not sprout up a third time.

Because the prairie rose takes two growing seasons to produce seeds, it is especially vulnerable to destruction. If plants are picked, mowed, or grazed upon during their first year, there are no seeds to replace the lost plants. Botanists are working to save this colorful delight of prairies past by protecting the tiny railroad prairie where it now lives from any disturbances or changes in habitat.

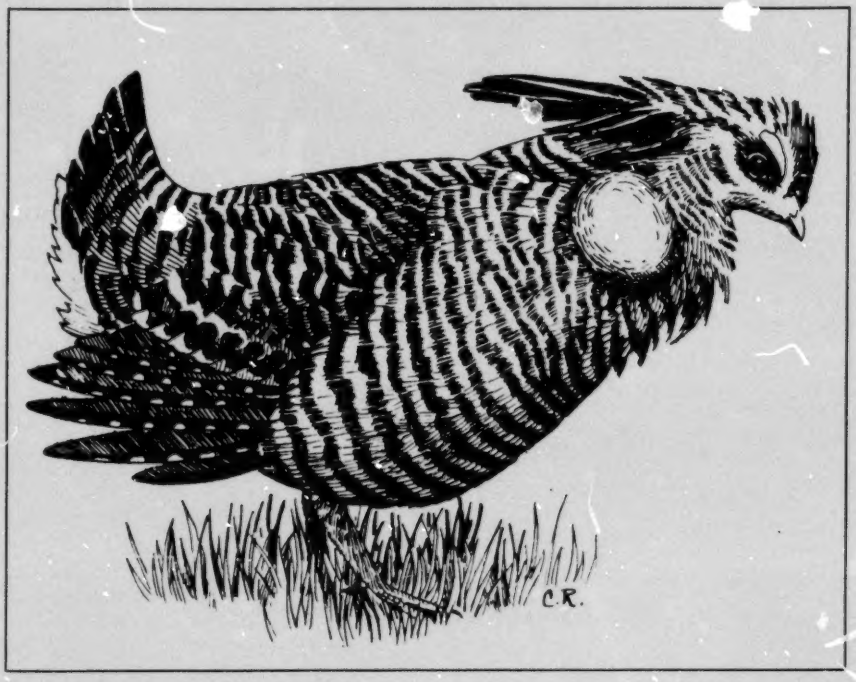
PRAIRIE ROSE GENTIAN

GREATER PRAIRIE CHICKEN

In early April the prairie chicken begins the peak of its annual mating ritual. Before dawn breaks on the prairie, male prairie chickens are hustling onto an area where they will "display" magnificent feats in order to outshine each other in the eyes of the prairie chicken hens. Each cock picks his own territory, then squaring off at the others, he thrusts his head forward, raises his tail and spreads his drooping wings. The feathers on his neck jut out like swords. The cock drums his feet and begins to dance, taking a short run, pivoting and then spinning in a circle. All the while, big orange air sacs beside the neck are inflated like balloons and the cock uses this to cut loose with mighty "booms". This is why the breeding area is called a "booming ground."

When the hens arrive at the booming grounds, they seem to act unimpressed as the cocks display all the more furiously, chasing them, whooping at them and even bowing to them by laying their heads on the ground. The hens usually mate with one cock but sometimes they do so with several.

After mating, the hen builds a nest of dead grass, stems and leaves in a grassy area, and lays her eggs. On about the twenty-fourth or twenty-fifth day of incubation, the first egg is pipping, and the hen begins reaching under her breast every few minutes to turn the egg. The following day, a sizable hole appears in the shell and the beak of the embryo can be seen inside the egg. The impatient hen picks away pieces of shell from the opening, as if trying to speed up the process, but it is the embryo that finally cracks open its shell and kicks free of its shell membrane. Soon the chick is pecking at its mother's beak and eye, and climbing up her slippery feathered back. The remaining chicks hatch within a few hours of the first and the hen leads her brood away from the nest to search for food and cover. The chicks hunt for insects, their main food, while the hen eats seeds, grain, flowers, leaves and bud twigs. The hen keeps her chicks under control by using her voice. If the chicks hear her call "brirrb-brirrb," they usually come to her at once. On the other hand, if a sharp-shrill call is issued the chicks cower down in the grass and freeze until danger has passed. During the hottest part of the day and the damp cold of



GREATER PRAIRIE CHICKEN

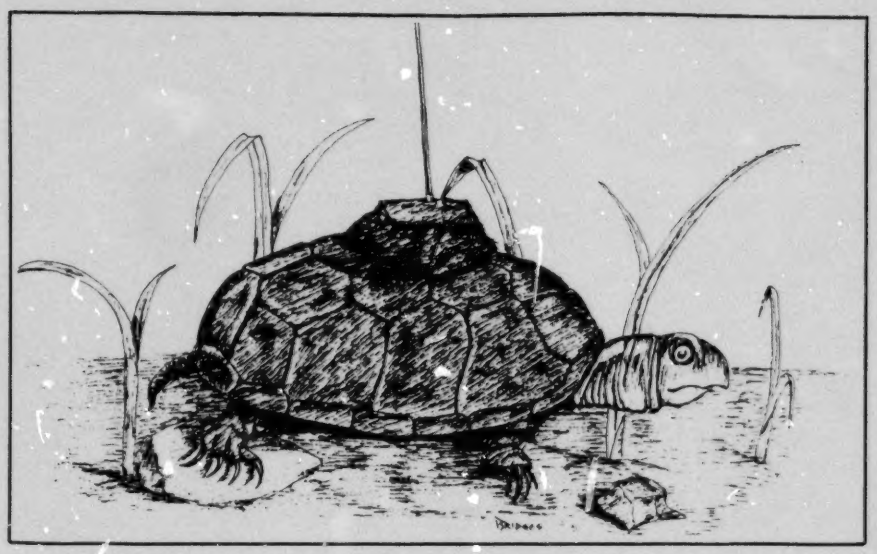
the night, the hen gathers her chicks about her body for protection.

As the prairie has been turned into farmland and cities, the prairie chicken has lost the habitat it needs. There now are just slightly more than 300 prairie chickens left in a state that once was home for millions. All but a

'Prairie Chickens' lifehold is precarious'

few of the surviving birds are living on or near sanctuaries managed by the Illinois Natural History Survey and the Illinois Department of Conservation in Jasper and Marion Counties. At the two sites, which total about 1,640 acres, biologists work with area farmers to grow nesting cover of red-top, timothy, brome and native prairie grass. Managers make sure that the dead or residual vegetation from last years growth is at least 12 inches high to shelter the female and her nest.

While larger populations of prairie chickens exist in Oklahoma, Kansas and Nebraska, their hold on life in Illinois is precarious at best. Success at the Marion and Jasper County sanctuaries is hampered by a combination of adverse factors. Predation upon eggs and young by skunks, opossums and minks has reached serious levels in the last few years. Aggressive ring-necked pheasants are harrassing the chickens on the booming grounds and laying their eggs in the chicken's nests. Since the pheasant eggs hatch two days sooner than the chickens', the chickens usually abandon their own eggs and nest. Despite these problems, a spring 1980 census of the chickens on the sanctuaries showed a gain of more than 100 birds since the spring of 1979. Encouraged by those results, management biologists and area citizens are working harder every day to see that the sanctuaries are kept free of disturbance so that these last remaining flocks of prairie chickens will be preserved in this their native homeland.



ILLINOIS MUD TURTLE (with research transmitter)

ILLINOIS MUD TURTLE

One of the rarest animals in the United States, the Illinois mud turtle lives above the ground less than 100 days each year.

Hibernating throughout the winter, Illinois mud turtles make their spring debut in April on the sandy regions of central and northwestern Illinois. At first, the water in nearby sandy-bottomed ponds, lakes and backwaters still is too cold for the temperature-sensitive turtles, but by mid-May, the turtles can be seen swimming through the water or basking lazily in the sun. The water world supplies the turtles with a rich menu of fish, crayfish, insects and fairy shrimp. A favored food-gathering technique of the little turtles is to plow furrows through the silt and leaves at the bottom of the pond, picking out bits of dead fish flesh from the ooze. Camouflaged against the dark bottom, the turtles are hard to see and catch. If captured by humans or predators, the turtles eject a protective, nauseating scent.

By mid- to late June, female turtles are busy digging out nesting caves in the sand. After a turtle has dug with her fore-legs into a hole, she turns around and piles sand over the entrance, totally enclosing herself as she lays two to six hard-shelled eggs. A shoreline littered with broken egg shells means that skunks and raccoons have once again discovered her hidden stash of eggs. Hatching in September, the young turtles are about the same diameter as a quarter. Attached to their lower shell is a bright yellow yolk sac, brimming with food for the youngster's first few weeks of life.

Adults are absent from the hatching scene. They have been buried in cool pouches beneath the ground since late July and August, escaping the summer heat and waiting for cooler weather. Sometimes, the turtles remain underground through fall and into their hibernation period. To survive an underground life for two thirds of the year, the turtles slow down their body functions to a bare idle, enabling them to survive with little food or water. The Illinois mud turtle, however, has a unique ability to catch food and eat while they are underground.

All of the known Illinois mud turtles in the world live in Iowa, Illinois and Missouri. Iowa is host to about 1,300 turtles at Big Sand Mound in eastern Iowa. The Illinois population is considerably smaller. A 1979 exploratory team

of biologists combing central and northwestern Illinois found only 37 turtles in 12 different locations. Fortunately, three locations are on state managed lands, where recovery recommendations can more easily be carried out.

At one location during the summer of 1979, biologists placed tiny radio transmitters on the backs of several turtles. The following spring, biologists were able to locate the hibernating turtles before they dug out of the ground. This information told them a great deal about the soil and habitat conditions that the turtles require for hibernation. Using the radio transmitters, biologists continued to track the turtles throughout the spring and summer to learn even more about the critical life requirements of the Illinois mud turtle.

The overall problem for the Illinois mud turtle has been the disappearance of its habitat, sandy areas with shallow, undisturbed ponds, as a result from agricultural drainage and cultivation. Biologists will try to reverse this trend by protecting these areas from construction, recreational activities, and agricultural chemicals and fertilizers.

MEAD'S MILKWEED

Mead's milkweed is one of the rarest plants in midwestern United States. A plant of the moist prairie, Mead's milkweed is known to occur in five midwestern states. It recently has disappeared from two of these states, but still is found in two Illinois locations. In Illinois, Mead's milkweed grows along an exposed bluff in Saline County and in the wild grasses along a railroad bed in Ford County. Mead's milkweed probably never has been common in Illinois, but it once grew more plentifully in the moist black soil of prairie. As this fertile soil was taken up by cities and farms, habitats that once were luxurious homes for plants like Mead's milkweed have become plant ghettos. The stubborn Mead's milkweed refuses to live in a "poverty" habitat and simply has vanished from these areas.

During the first warm days of April, the underground roots of Mead's milkweed push tiny sprouts up through the soil. By June, the flowers are bursting open. The blossoms are pollinated by one or more insect species, but the identity and whereabouts of these mysterious benefactors is a riddle. Botanists speculate that the plants are faring so poorly either because they are so scarce that the insects cannot find them or that the insect responsible for pollination has disappeared.

Learning more about how Mead's milkweed is pollinated is an important step botanists want to take in helping it to survive. In the meantime, the prairie remnants where this wildflower lives in Illinois should be protected from habitat changes.

UPLAND SANDPIPER

"About 1880, when the supply of passenger pigeons began to fail, and the marketmen, looking about for some other game for the table of the epicure in spring and summer, called for plover, the destruction of the upland plover (upland sandpiper) began in earnest. The price increased. In the spring migration the birds were met by a horde of market gunners, shot, packed in barrels and shipped to the cities."

-from the notes of Edward H. Forbush (1912)

Today's protective game laws would never allow the type of abuse the upland sandpiper once suffered. Once plentiful, following two decades of market hunting, the upland sandpiper literally had been hunted to the edge of extinction.

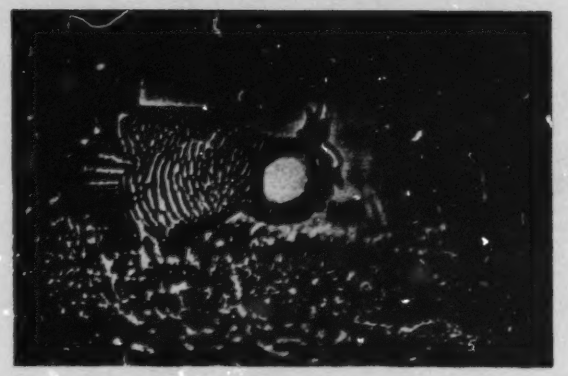
In recent history, the greater problem faced by this prairie nesting bird, which is the color of dead grass, has been widespread disappearance of pastures and hayfields. Since farmers are grazing less livestock, these areas have vanished to make room for row crop farming.

It is ironic that changing farming practices have played a part in this birds' demise, because upland sandpipers have been beneficial to croplands since they eat destructive grasshoppers, crickets, and weevils. Long-legged sandpipers even lend a helping hand to cattle by picking horseflies and cattle ticks off their itchy hides.

Upland sandpipers spend their summers in the central United States and Canada and arrive in Illinois from their South American winter homes usually by May. Upon their arrival, wild courtship routines of hopping and twittering at each other begin. Another mating ceremony occurs when a bird circles high into the sky and whistles a shrill cry that can be heard for a mile. Suddenly the love-struck bird folds its wings and plunges to the earth like a falling star. On the ground or perched on a pasture fence post, sandpipers sing a more musical "love song" which is full of sweet, lullaby type melodies.

A sandpiper nest is a clump of dead grass set into a dip in the ground. Three to five young are hatched in June. The downy chicks have such long legs that they look almost like newborn calves. Adults, especially the male, are fiercely protective of the youngsters and if danger nears a family group, the adult will sound a sharp alarm note and the young scatter in many directions. As soon as the chicks are ready to fly, in July or early August, the birds gather in flocks, and begin their 7,000-mile trip to their winter homes, always traveling at great heights during the night with their beaks pointed like compasses toward the south.

The Department of Conservation has asked amateur and professional ornotholigists across Illinois to watch for breeding upland sandpipers in an effort to learn more about this species' nesting and habitat requirements. In the meantime, efforts to aid the upland sandpiper, known as "field plover" or "prairie dove," will concentrate on managing large tracts of grasslands.



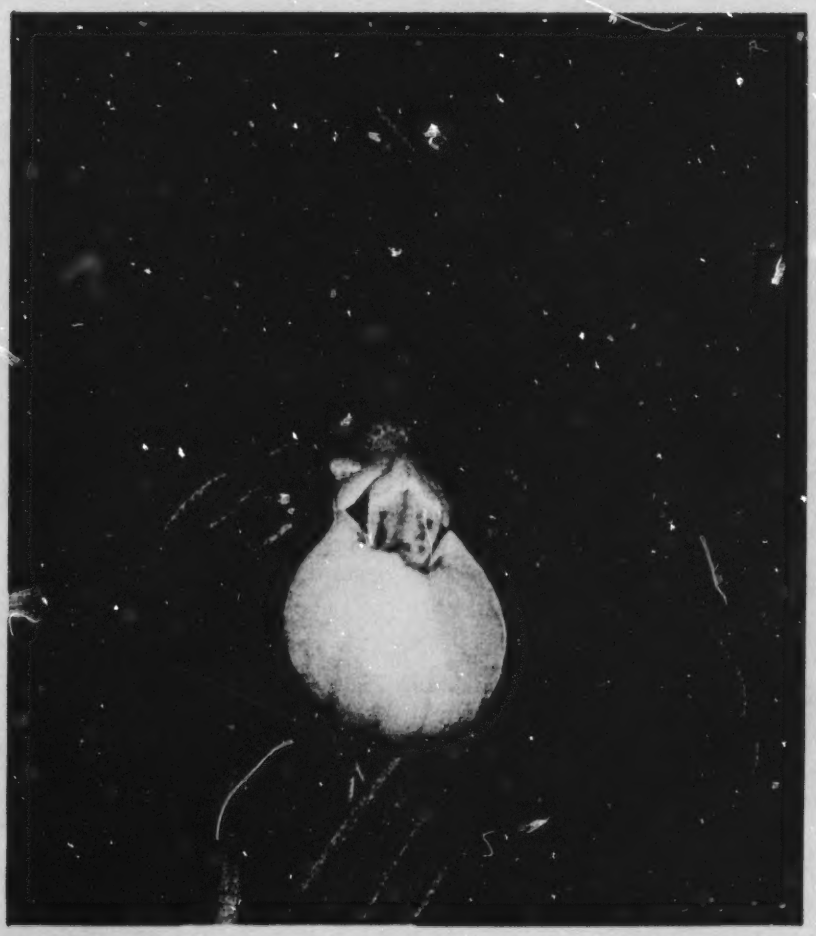
GREATER PRAIRIE CHICKEN

WHITE-TAILED JACKRABBIT

Vanishing Species Of A Dwindling Prairie . . .

PRAIRIE WHITE FRINGED ORCHID

UPLAND SANDPIPER



WHITE LADY SLIPPER

WHITE LADY'S SLIPPER ORCHID

The white lady's slipper is a wonderfully attractive orchid--its leafy green stem standing about six to 10 inches high and supporting a single flower.

White lady's slipper grows wild on prairies of the states bordering the great lakes. Once a common ornament on the Illinois prairie, this wildflower now is extremely rare in the state. The grasslands which once supported white lady's slipper now lie beneath our sprawling cities and farms. As this orchid has become less and less available, gardeners and orchidists, eager to capture its beauty, have raided even protected sites to get the plants. At the dozen or so patches of prairie where white lady's slipper still is found, these orchids sometimes total only two or three plants, but continue to grow with vigor. Living in unfarmed and ungrazed wet grasslands, white lady's slipper avoids dry conditions. It often grows around the grassy edges of a bubbling underground spring. Each year white lady's slipper comes up from the same roots that sprouted the previous spring. These roots spread out underground and the plants come up in clumps. Its flowers bloom in mid-May and June and are pollinated by small bees. Attracted by the sweet fragrance of the blossom, the bees enter the lip or pouch in search of nectar, even though this orchid produces no such treat.

Fortunately white lady's slipper orchid grows in several Illinois Nature Preserves and Forest Preserves. At these places, managers can protect the orchid from disturbances such as construction, mowing, and collecting.

PRAIRIE WHITE FRINGED ORCHID

Prairie white fringed orchid has a leafy green stalk that grows from one to three feet tall and 10 to 30 flowers that curl outward like tiny white fingers.

A plant of wet grasslands along the Mississippi Valley to the Great Lakes Region, prairie white fringed orchid was once found across the northern two-thirds of Illinois. Prairie white fringed orchid grows in only five or six patches of what is left of the Illinois prairie, usually along unmowed railroad beds or in pioneer cemeteries.

Prairie white fringed orchid is a perennial plant, coming up from the same root stalk each June or July. In order to produce a seed, its flowers must be pollinated by the hawkmoth. As dusk approaches, the orchid releases an attractive odor and sweet-tasting nectar to entice the nocturnal hawkmoth to its petals.

To preserve this beautiful wildflower in Illinois, the prairie remnants where it now lives need to be protected. Managers are working to preserve natural grasslands by preventing the growth of trees and brush which shade out the sun-loving prairie plants.

WESTERN HOGNOSE SNAKE

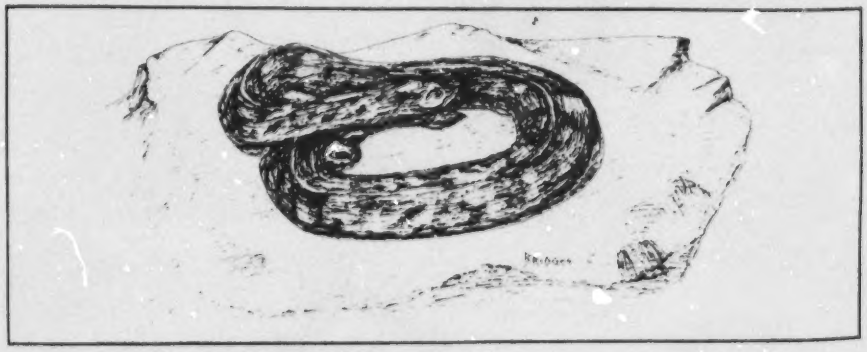
If the western hognose snake was a poker player, it surely would bluff every hand. When confronted by an intruder, this snake flattens it neck and head to look like a deadly cobra, hisses and strikes ferociously. But the harmless snake usually never hits its would-be victim, and when the intruder is not scared away, the hognose snake plays its trump card. Shaking its body about, it vomits and flops over on its back pretending to be dead. A few minutes after the intruder leaves, the snake slithers safely away.

Western hognose lives in sandy habitats near the Mississippi and Illinois Rivers in north and central Illinois. The snakes are about 28 inches long, jet black on their belly and heavily blotched with dark spots on their back. They have long teeth and strong jaws, but rarely bite.

Mating occurs in May. An average of 24 eggs are laid in June and July and hatch two or three months later.

Awakening from their winter hibernation in mid-April, the snakes remain active until the first chilly days of October. This stout, slow-moving snake leaves wide tracks in the sand. A dip in the sand indicates where a snake has used its turned up snout to dig out a toad. Two sharp teeth, one on each side of the snake's upper jaw, are used to puncture the skin of a toad in order to swallow it, because toads usually bloat their bodies up with air when they are captured. Other menu items for the Western hognose include mice, birds, lizards and small snakes.

Primary recovery recommendations for this unusual snake involve acquiring and protecting sandy regions. A public information campaign is planned to let everyone know that just because many snakes like the western hognose have triangular heads or other frightening features or habits, the vast majority of these peaceful reptiles are harmless.



WESTERN HOGNOSE SNAKE

Following is the complete listing of species of fauna and flora which are endangered or threatened in the state of Illinois. Endangered species are any species which is in danger of extinction as a breeding species in the state. Threatened species are any breeding species which is likely to become a state endangered species within the foreseeable future in Illinois.

MAMMALS - ENDANGERED
- Gray Bat
- Indiana Bat
- Eastern Wood Rat
- White-tailed Jackrabbit

MAMMALS - THREATENED
- River Otter
- Bobcat
- Golden Mouse
- Rice Rat

BIRDS - ENDANGERED
- Double-crested Cormorant
- Snowy Egret
- Great Egret
- Little Blue Heron
- American Bittern
- Black-crowned Night Heron
- Mississippi Kite
- Cooper's Hawk
- Red-shouldered Hawk
- Swainson's Hawk
- Bald Eagle
- Osprey
- Marsh Hawk
- Peregrine Falcon
- Greater Prairie Chicken
- Yellow Rail
- Black Rail
- Purple Gallinule
- Piping Plover
- Eskimo Curlew
- Upland Sandpiper
- Wilson's Phalarope
- Forster's Tern
- Common Tern
- Least Tern
- Black Tern
- Barn Owl
- Long-eared Owl
- Short-eared Owl
- Brown Creeper
- Bachman's Warbler
- Yellow-headed Blackbird
- Bachman's Sparrow

BIRDS - THREATENED
- Common Gallirule
- Bewick's Wren
- Veery
- Loggerhead Shrike
- Swainson's Warbler
- Brewer's Blackbird
- Henslow's Sparrow

AMPHIBIANS, REPTILES - ENDANGERED
- Dusky Salamander
- Silvery Salamander
- Spotted Turtle
- Slider
- Illinois Mud Turtle
- Broad-banded Watersnake
- Eastern Ribbon Snake

AMPHIBIANS, REPTILES - THREATENED
- Illinois Chorus Frog
- Western Hog-nosed Snake
- Whip Snake
- Great Plains Rat Snake

FISH - ENDANGERED
- Bigeye Chub
- Bluebreast Darter
- Bluehead Shiner
- Harlequin Darter
- Longjaw Cisco

FISH - THREATENED
- Cisco
- Longnose Sucker
- Alligator Gar
- Pugnose Shiner
- Blacknose Shiner
- Bantam Sunfish
- Lake Whitefish
- Lake Sturgeon

MUSSELS - ENDANGERED
- Higgin's Eye Pearly
- Orange-footed Pimpleback
- Pink Mucket Pearly
- Rough Pigtoe Pearly
- Sampson's Pearly
- Tuberculed-blossom Pearly
- White Cat's Paw Pearly
- White Wartyback Pearly

PLANTS - ENDANGERED
- Marsh Horsetail
- Meadow Horsetail
- Running Pine
- Ground Pine
- Bog Clubmoss
- Southern Grape Fern
- Daisyleaf Grape Fern
- Dwarf Grape Fern
- Log Fern
- Oak Fern
- New York Fern
- Long Beech Fern
- Rusty Woodsia
- Virginia Chain Fern
- Trailing Juniper
- Jack Pine
- Shortleaf Pine
- Red Pine
- Small Burhead
- Arrowhead
- Water Arum
- Thismia
- Prairie Spiderwort
- Winged Sedge
- Golden Sedge
- Swollen Sedge
- Plantain-leaved Sedge
- Sedge (24 species)
- Galingale
- Knotted Spikerush
- Spikerush (3 species)
- Rusty Cotton Grass
- Tall Cotton Grass
- Baldwin's Frimbristylis
- Vahl's Frimbristylis
- Umbrella Grass
- Mottled Lipocarpha
- Grass Beak Rush
- Beak Rush (2 species)
- Tufted Bulrush
- Alkali Bulrush
- Weak Bulrush
- Bullrush (7 species)
- Netted Nut Rush
- Bearded Wheat Grass
- Marram Grass
- Three-awn
- American Slough Grass
- Drooping Wood Reed
- Manna Grass
- Northern Manna Grass
- Rattlesnake Grass
- Beard Grass
- Salt Meadow Grass
- Northern Panic Grass
- Hemlock Panic Grass
- Long-leaved Panic Grass
- Panic Grass (7 species)
- Hairy Bead Grass
- Bead Grass (2 species)
- Grove Bluegrass
- Bluegrass
- Weak Bluegrass
- Wolf's Bluegrass
- False Melic Grass
- Eastern Blue-eyed Grass
- Mountain Blue-eyed Grass
- Richardson's Rush
- Vasey's Rush
- Hairy Woodrush
- Arror Grass
- Common Bog Arrow Grass
- Slender Bog Arrow Grass
- Wild Hyacinth
- Turk's Cap Lily
- Indian Cucumber Root
- Downy Solomon's Seal
- Nodding Trillium
- Trillium
- Ill-scented Trillium
- White Camass
- Powdery Thalia
- Moccasin Flower
- Small Yellow Lady's Slipper
- White Lady's Slipper
- Showy Lady's Slipper
- Orange Fringed Orchid
- Wood Orchid
- Tubercled Orchid
- Hooker's Orchid
- Prairie White Fringed Orchid
- Purple Fringed Orchid
- Crested Coralroot Orchid
- Small Whorled Pogonia
- Whorled Pogonia
- Snake-mouth
- Yellow-lipped Ladies' Tresses
- Hooded Ladies' Tresses
- Spring Ladies' Tresses
- Mud Plantain
- Grass-leaved Pondweed
- White-stemmed Pondweed
- Spotted Pondweed
- Fern Pondweed
- Stiff Pondweed
- Vasey's Pondweed
- American Burreed
- Green-fruited Burreed

(Continued on page 26)

BEST COPY AVAILABLE

ILLINOIS ENDANGERED AND THREATENED SPECIES

This poster shows some of the living species that may disappear forever from Illinois. It expresses a problem that is occurring throughout the world — the decline and extinction of plant and animal species, and a loss in the diversity and beauty of nature. Few people realize that this loss is taking place, and what it means. With our limited knowledge, we can't guess at the value of these plants and animals to the future. We don't know what endangered species might help cure a future disease, or provide a new food source for a growing population. Ecologists say we must maintain the diversity of our living environment as a "gene bank" for evolutionary change. As our present world is a product of past diversity, so will the richness and beauty of the future depend on today's diversity. There is also an ethical reason for saving species: they have a right to survive, as you and I have such a right, simply because they have persisted through time, because they are alive.

Why are these species in trouble? The primary answer is that we are destroying the places where they live, their habitats. We can help protect these species for the future by learning more about their life histories, by providing a place for them to live, and by strengthening our state laws for their protection.

ILLINOIS AUDUBON SOCIETY ILLINOIS ENDANGERED SPECIES PROTECTION BOARD ILLINOIS DEPARTMENT OF CONSERVATION

BEST COPY AVAILABLE

Water Willow
Moschatel
Bloodleaf
Bristly Sarsaparilla
Virginia Snakeroot
Woolly Milkweed
Mead's Milkweed
Oval Milkweed
Climbing Milkweed
Allegheny Barberry
Speckled Alder
Yellow Birch
Gray Birch
Stickseed
Slender Heliotrope
Marbleseed
Arrowwood
Royal Catchfly
Great Chickweed
False Heather
Pinweed
Water Marigold
Carolina Thistle
Thoroughwort
Clammy Cudweed
Tall Sunflower
Lakeside Daisy
Wild Lettuce
Western Wild Lettuce
White Melanthera
Prairie Dandelion
Missouri Orange Coneflower
Goldenrod (2 species)
Bunchberry
Cuckoo Flower
Whitlow Grass
Silvery Bladderpod
Hairy Marsh Yellow Cress
Yellow Cress
Squirting Cucumber
Round-leaved Sundew
Buffaloberry
Bearberry
Wintergreen
Highbush Blueberry
Large Cranberry
Deerberry
Spurge
Seaside Spurge
American Chestnut
Nutall's Oak
Screwstem
Prairie Rose Gentian
Northern Cranesbill
Shore St. John's Wort
Northern St. John's Wort
St. John's Wort
Kalm's St. John's Wort
Marsh St. John's Wort
One-flowered Hydrolea
Phacelia
Pale Hickory
Sessile Water Horehound
False Dragonhead
White Mountain Mint
Mountain Mint
Hedge Nettle
Hairy Synandra
Smooth False Indigo
Price's Groundnut
Tennessee Milk Vetch
Yellow Wild Indigo
Yellowwood
Boykin's Dioclea
Beach Pea
Prairie Clover
Leafy Prairie Clover
Buffalo Clover
Horned Bladderwort
Flat-leaved Bladderwort
Small Bladderwort
Kankakee Mallow
Globe Mallow
Sweetfern
Small Enchanter's Nightshade
Small Dundrops
Broomrape
Clustered Broomrape
Large Wood Sorrel
Golden Corydalis
Hale's Corydalis
Pink Corydalis
Heart-leaved Plantain
Small Plantain
Silverbell Tree
Bigleaf Snowbell Bush
White Basswood
Rock Elm
Hemlock Parsley
Small Wild Carrot
Eryngo
Water-pennywort
Mock Bishop's Weed (2 species)
Nettle
Corn Salad (2 species)
Marsh Valerian
Canada Violet
Hairy White Violet
Primrose Violet
Plains Violet
Phlox
Sangamon Phlox
Pink Milkwort
Halbred-leaved Tearthumb
Carey's Heartsease
Smartweed
Sour Dock
Fameflower
Jeweled Shooting Star
Loosestrife
Creeping Loosestrife
Bird's-eye Primrose
Spotted Wintergreen
Pipsissewa
Round-leaved Shinleaf
One-sided Pyrola
False Bugbone
Blue Jasmine
Leatherflower
Spearwort
Seaside Crowfoot
Supple-jack
Redroot
Alder Buckthorn
Shadbush
Purple Avens
Narrow-leaved Crabapple
Cinquefoil
Arching Dewberry
Purple-flowering Raspberry
Rubus Odoratus
Dwarf Raspberry
Bristly Blackberry
American Burnet
American Mountain Ash
Barren Strawberry
Dwarf Bedstraw
Balsam Poplar
Autumn Willow
Dune Willow
Wooly Buckthorn
Pitcher Plant
Mock Orange
Northern Gooseberry
Early Saxifrage
Water Hyssop
Downy Yellow Painted Cup
Cow Wheat
Yellow Monkey Flower
Large-flowered Beard Tongue
American Brooklime

PLANTS - THREATENED

Northern Grape Fern
Bradley's Spleenwort
Black Spleenwort
Hay-scented Fern
Ground Juniper
Arbor Vitae
Tamarack
Twig Rush
Spike Rush
Beaked Rush
Bulrush
Rice Grass
Swamp Red Iris
Grass-leaved Lily
False Asphodel
Green Trillum
False Hellebore
Grass Pink
Spotted Corral-root Orchid
Tubercled Orchid
Ginseng
Narrow-leaved Green Milkweed
Climbing Milkweed
Jame's Clammyweed
Yellow Honeysuckle
Red-berried Elder
Slender Sandwort
Strawberry Bush
False Tarragon
Aster
Schreber's Aster
Narrow-leaved Sunflower
Cliff Goldenrod
Patterson Bindweed
Sea Rocket
Narrow-leaved Sundew
Leatherleaf
Willow Oak
Rock Chestnut Oak
Blue Sage
Pale Vetchling
Downy Willow Herb
Star-flower
Golden Seal
Prairie Buttercup
Queen-of-the-Prairie
Bog Bedstraw
Sullivantia
Marsh Speedwell
Storax
Water Elm
Dog Violet

*A complete listing of endangered and threatened plants by common and scientific names is contained in the publication, "The Endangered and Threatened Plants of Illinois" available free from the Conservation Department address shown on the back cover of this booklet.

"Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question of whether a still higher 'standard of living' is worth its cost in things natural, wild, and free."

--Aldo Leopold
Sand County Almanac

The passenger pigeon, once numbering in the millions, today is gone from earth.

The Effort To Save Our Heritage

The Illinois Endangered Species Act was passed in 1972. The Act established the Endangered Species Protection Board which is dedicated to the protection of endangered and threatened species in Illinois.

The definitions of Endangered and Threatened species are as follows:

FEDERALLY ENDANGERED SPECIES: Any species which is in danger of extinction throughout all or a significant portion of its range.

FEDERALLY THREATENED SPECIES: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

ILLINOIS ENDANGERED SPECIES: Any species which is in danger of extinction as a breeding species in Illinois.

ILLINOIS THREATENED SPECIES: Any breeding species which is likely to become a state endangered species within the foreseeable future in Illinois.

The Department of Conservation is developing educational, research, management, and recovery plans for these species. These programs will be successful if you and other Illinoisans contribute.

What You Can Do For These Precious Few

Preserving our remaining "Precious Few" endangered and threatened species is possible through dedicated commitment by government, private organizations and individual citizens.

Following are some ideas you can do to help:

--Join an organization interested in natural resources preservation.

--Arrange programs on natural resources for groups in your community.

--Support legislation in the Illinois General Assembly and in Congress that promotes natural resources conservation.

--Learn to recognize Illinois' endangered and threatened species. Information on sightings of endangered and threatened species will (for birds during breeding season only) help in evaluating their relative abundance and aid in planning management programs for their benefit. If you have information on confirmed sightings of any endangered or threatened species, contact:

Department of Conservation
Endangered Species Coordinator
605 Stratton Office Building
Springfield, IL 62706

Wildlife Abounds In Vanishing Wetlands

When the last glaciers in Illinois melted about 15,000 years ago, they left behind 1.4 million acres of lakes, rivers and wetlands that later provided Illinois Indians with fish, meat, fur and wild rice.

These rivers and lakes became critical arteries for commerce when early French and British settlers arrived in Illinois. The settlers discovered the wetlands, especially the river bottoms, contained incredibly rich soil for farming.

As word of the rich Illinois soil spread back east, more and more settlers arrived to take up farming, and increased amounts of land were drained, cleared and plowed.

The generous soil has been a mixed blessing, however. Though Illinois has reaped great wealth from farming and related industries its lakes and rivers have paid the price by suffering heavy pollution from pesticides, waste products and silt. Additionally, the vast majority of wetlands have been drained to make room for farming and commercial development. Today fewer than 500,000 acres of Illinois' wetlands remain.

Plants and animals have been hit hardest by the loss of these wetland/water habitats. Almost all plants and animals depend on wetland/water habitats for at least some of their life requirements, while others depend solely on such habitats for survival.

Wetlands include: seasonally flooded basins or flats (usually timbered bottomlands along larger streams which are dry most of the year, but flooded during high river stages), wet meadows (seasonally flooded meadow bottoms where vegetation is mostly grasses, sedges and rushes), shallow or deep marshes (marshes with up to six inches of water for the shallow marshes, with vegetation including grasses, bulrushes, cattails and smartweeds; and areas with from six inches to three feet or more of water for deep marshes, with similar vegetation, but with more open areas and including pondweed, coontail, duckweed and water lily), swamps (areas with up to six inches of water commonly found along small sluggish streams in forested areas and characterized by shrubs and trees), and bogs (areas normally found in the glaciated depressions of northeastern Illinois which, because of poor drainage, almost always are waterlogged with standing or slowly moving water and covered with a spongy layer of mosses).

Water habitats in Illinois are comprised of open waterways such as lakes and ponds (bodies of standing water), and streams and

rivers (bodies of flowing water).

Grouped together by their common bond of water, wetlands and waterways provide some of the most productive homes in the world for plants and animals. They also are beneficial to man in countless ways. Wetlands absorb flood waters, filter silt and acids from water and continually recharge water tables. Rivers, lakes and streams provide passage for commerce, opportunities for recreation and supplies of fish and wildlife.

Though the profits from wetlands/water are tremendous for all living things, these areas are themselves, terribly fragile living systems and should be protected carefully from harm.

DUSKY SALAMANDER

People in Medieval times believed that salamanders could march through fire because their cool, slimy skin could shield them from the flames. However, the only magic performed by the dusky salamander is a quick disappearing act. These salamenders are extremely hard to catch, because they slide so sleekly under rocks, through leaves and out of sight.

The dusky salamander is abundant across eastern United States, but only a few colonies of this salamander live in extreme southern Illinois in Pulaski County.

This fat salamander is yellow to light red to brown, and has brown markings. The favorite habitat of the dusky is in and around a rocky spring or stream set snugly into a heavily forested ravine. This quick, alert and hardy creature has no problems snagging spiders, worms and even other salamanders for food.

During fall, the smaller female dusky lays her clutch of 20 to 30 eggs near the water. She stays with her eggs, supposedly to protect them, although she sometimes eats dead ones herself. After about two months the eggs hatch, but creatures very different from the adult salamanders wriggle away from the eggs and into the water. These larvae have gills and breathe more like fish than salamanders. Before a year is out, though, the larvae lose their gills and become full fledged salamanders. They may live up to 10 years.

The dusky salamander is very sensitive to habitat disturbances. Though one dusky colony in Pulaski County is protected by a nature preserve, the other colonies need to be protected from uncontrolled timber cutting and water pollution.

SPOTTED TURTLE

The shell of the spotted turtle bears the colors of a jet black night sprinkled with bright golden stars.

The spotted turtle occurs in the northeastern and eastern United States, and Illinois is on the extreme western border of its range. A few spotted turtles living in Illinois were recorded in the Lake Michigan area before Chicago and its suburbs became so heavily populated and destroyed much of the turtles favored habitat. Ponds, marshes and swamps bordered by woods and meadows have fallen victim to industrial and urban growth during the last 30 years. As a result, spotted turtles have nearly vanished from sight in northern Illinois.

With the first crisp days of November, spotted turtles burrow into muddy banks or pond bottoms for a long winter's hibernation. Emerging in spring, the turtles busy themselves with courtship and mating. The male turtle chases the female through the water. Two males will fight over a favored mate, tackling each other and biting at the soft fleshy parts around the head and legs. During June, the female digs a nesting hole in the earth near the water. She lays two to four eggs and buries them carefully, to hide them from marauding raccoons and skunks. Hatching in September, the young resemble the adults, but are adorned with fewer spots.

Spotted turtles visit favorite sunning stations on rocks and logs every summer. But if the basking turtles are disturbed, they quickly slide into the water and hide under a bank, in weeds, or buried in the muddy bottom. Like most aquatic or semi-aquatic turtles, spotted turtles swallow insects, tadpoles, frogs, worms and snails with a culp of water.

Spotted turtles are not entirely water creatures, however. They make slow, lonely jaunts over land for no apparent reason except that dry air evaporates pesky leeches, allowing them to fall off the turtles.

In June of 1980, a spotted turtle was found in Will County on Lockport Prairie, a valuable natural area that hosts another endangered species, leafy prairie clover. If investigations at the site show a population of spotted turtles, managers will work to protect their habitat, as well as the entire ecosystem, from development and recreational activities.

SLIDER

The Illinois slider is a mixed breed of turtle, having developed from the hieroglyphic turtle and the Missouri slider. Etched upon the green shell of the slider are bright golden lines, which look very much like ancient Egyptian hieroglyphics.

Though these hybrid turtles once lived in many of the major rivers and lakes of southern Illinois, they now are very rare in Illinois. The last slider recorded in Illinois was found at Horseshoe Lake in Alexander County, in 1951. When this lake went dry in 1930, many of the sliders living there were killed. Since

then, development at the lake has increased because the lake and the surrounding area are part of a popular state park and hunting area. Moreover, drainage operations at ponds and swamps in the same region, as well as channelization efforts at some nearby rivers, have kept the slider from making a strong comeback in Illinois.

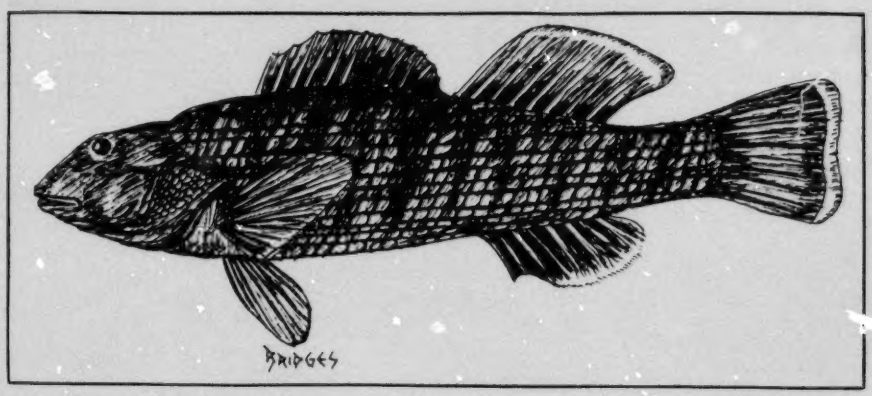
The yearly life history of the slider begins in spring when the turtles awaken from winter hibernation. Approximately nine hard white eggs are laid in June. Hatching in late summer, the young turtles are round like silver dollars, and the central keel of their shell is very weak, making them easy prey for large birds, fish, snakes and other turtles. Sliders feed on crayfish, tadpoles, insects, dead fish and water plants. Even though sliders hide from humans, these bodily colored turtles are easy to spot if they are caught off guard.

Biologists hope that people enjoying the outdoors soon will recognize some of these turtles once again in Illinois. In the meantime, the aquatic homes of sliders should be preserved and kept ready for their homecoming.

BLUEBREAST DARTER

Scattered populations of the bluebreast darter are found in rivers of the east-central United States. The flashy bluebreast is worn only by the males of the species. Decorated for the breeding season, the males of the many species of darters parade brilliant pinks, reds, blues and yellows.

The bluebreast darters living in the Middle Fork of the Vermilion River in Vermilion County exist on the extreme western edge of the fish's range. These darters have adapted to living in this swiftly moving rocky river.



BLUEBREAST DARTER

To keep from being swept downstream, bluebreast darters have lost the gas-filled swim bladder that most fish have. The bladder helps to suspend fish in the water and without this buoy, darters sink to the bottom where the press of the current helps them to rest securely on their fins. For extra protection from the direct current, the fish sometimes hide between rocks or behind large boulders.

The spawning season of the bluebreast darter occurs in May and June. Males select and defend small territories around large rocks where females lay hundreds of eggs. After the eggs hatch, the young darters tend to stay near smaller rocks in the more quiet parts of the river.

Bluebreast darters can live only in clean, clear water. Because of this, biologists regard darters as excellent indicators of the overall environmental quality. At present, the Middle Fork of the Vermilion river is a high quality river, but it constantly is threatened by chemical and pesticide run off from agricultural land. To insure that the river continues to meet the living requirements of the bluebreast darter, and the other rare organisms finding shelter there, its waters should be carefully protected from pollution.

LONGJAW CISCO

The longjaw cisco formally was common in Lake Huron and Lake Michigan, although there is no valid record of this species from the Illinois portion of Lake Michigan. Populations of longjaw ciscoes declined in these lakes because of intensive commercial fishing and predation by the sea lamprey.

Although biologists now are able to control the numbers of sea lampreys with the use of a special chemical, the longjaw remains extremely rare in Lake Michigan and Lake Huron.

Very little information exists about the ecology of this northern, cold water fish. Averaging 12-14 inches in length, this slender, silvery fish moves inshore in July and August to prepare for spawning. By November, ciscoes lay eggs over hard bottoms of sand or gravel in depths ranging from the shallows to nearly 100 feet deep. The unguarded eggs scatter across the bottom and hatch in 10 to 12 weeks. Both young and adult ciscoes feed on plankton, large crustaceans and occasionally on small fish.

If the longjaw cisco is to be protected, the sea lamprey must be kept under control. It also would be wise to control fishes like alewife, smelt and bloater chub because they compete with the longjaw cisco for food.

RIVER OTTER

River otters appear to love to play. Splashing and swirling in the water, otters play follow the leader and tag much like kids at a summer swimming hole. It seems their greatest joy is to zoom head first down a mud or snow bank. Otters carefully grease a good sliding bank by picking out every rock and stick. Then they pack the surface down by sliding down the bank over and over with their slick wet bodies.

River otters live in Illinois along the Mississippi and Illinois rivers, and in some smaller waterways of southern Illinois. River otters prefer to live in woody areas beside clean water. Their den is dug into a shoreline or stream bank, or into the hollow base of a tree standing along the shoreline.

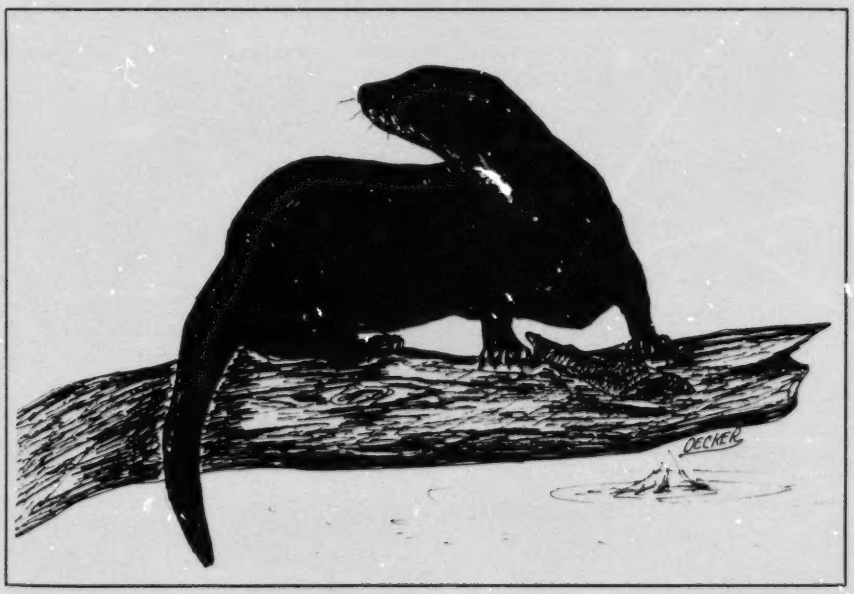
Like an underground cave, the entrance to the den always is under the water surface. This protects the two to four pups from predators such as bobcats, coyotes, great horned owls and bald eagles. Young otters stay with their parents for a full year in order to learn the secrets of swimming and huntings. Before the year is up, an otter pup grows to be 3½ to 4½ feet long, an excellent swimmer and a successful hunter of snails, clams, crayfish and fish.

Unfortunately, otters sometimes compete with man for fish. It is not unusual for an otter to be killed from being caught on fishing hooks or in nets, but fishing accidents have been the least of the otter's problems. Early settlers trapped the otter for its valuable fur, depleting much of the population. During this century, waterways have been polluted and natural shorelines destroyed to the extent that otters are unable to find decent shelter.

Trapping otter now is illegal, and conservationists are trying to clean up the Illinois and Mississippi rivers, as well as other waterways. If clean, fresh and protected places for the otter to live and play in can be brought back, this species will stand a good chance of making a comeback in Illinois.

COMMON GALLINULE

Common gallinules live in deep water marshes, amid the cattails, bulrushes, and scattered muskrat houses. The gallinule sometimes is confused with another marsh associate, the familiar American coot, but the 14-inch, black, slender and sharp gallinule has an unmistakable bright scarlet bill, while the coot has a white bill.



RIVER OTTER

Gallinules are uncommon migrants in Illinois, but they nest in some of the few remaining northeastern Illinois marshes. The gallinule nest, built of grasses and rushes, is 1½ feet in diameter and floats on a platform of dry reeds. The adult builds a gangplank leading from the edge of the nest into the water so the six to 12 young can scoot in and out of the nest soon after they hatch. Occasionally when young birds are in the water they do not notice the approach of enemies like large snakes, frogs or turtles. A quick swim, a race up the gangplank and a dive under the hen's warm wing saves the life of many young gallinules. The parent carefully dries the black, downy chicks and cares for them until they are about one month old. At that time the adult is ready to mate again.

Gallinules move about a marsh by swimming secretively through the dense rushes and cattails. When standing still, they use their long toes to keep from sinking in the deep mud. These toes also come in handy when the gallinules pop out of the water and scurry over lily pads in search of snails, insects and worms. Gallinules also feed on seeds, roots and the soft juicy parts of water plants. They fly feebly and awkwardly, dangling their legs about and landing in an almost belly-flop manner.

Come fall, gallinules leave the marshes of Illinois and head for wintering grounds far to the south.

Illinois' deep water marshes must be preserved if the state hopes to continue attracting these birds for summer nesting.

EASTERN RIBBON SNAKE

The Eastern ribbon snake makes only one demand--a place to live that is blessed with clean, undisturbed water.

The marshes and prairie ponds common to early southeastern Illinois were ideal homes for this snake. But after the turn of the

century, towns, cities and large farms swallowed up many natural wetlands. Sometime during this process, the Eastern ribbon snake disappeared from sight. If the snake still lives in Illinois, its whereabouts are unknown.

As its name implies, the Eastern ribbon snake lives in the eastern half of the United States and is similar in appearance to a long strand of striped ribbon. The Eastern ribbon snake grows to be 18-26 inches long, with its slender tail making up at least a third of its body. Its three stipes are yellow and its belly is yellowish or greenish.

Ribbon snakes favor wetlands that are flourishing with plants and sunshine. The snakes are good at climbing over logs and rocks, and they are speedy swimmers. They feed primarily on small fish, frogs and salamanders. Their young are born in July or August.

In hopes that the Eastern ribbon snake may still live in Illinois wetlands should be given high priority as important areas to preserve in the future.

AMERICAN BITTERN

The American bittern is a master of disguise and hard to spot. Looking for a bittern means putting on hip boots and wading into a marsh. This bird sits quietly and tries to imitate a clump of cattails by pointing its slender neck and bill upwards. The rusty-colored streaks along the neck helps camouflage the bird.

American bitterns nest in some of the larger marshes in northern and central Illinois. The nest is built of loosely tangled reeds and floats on the water. The three to five young are awkward, ugly chicks and if the female parent is away, they are easy prey for minks, muskrats, water snakes, hawks and owls. When the adult bittern is at home, however, only a foolish enemy will confront this fierce fighter. Its bill can cut a foe like a dagger.

AMERICAN BITTERN

The adult brings food to the young by laying its beak down on the nest, shaking its body terrifically and regurgitating a freshly caught meal of fish and frogs. The young bird sticks its beak into the parent's beak and sucks up the meal.

The behavior of mating bitterns is spectacular. Two birds stalk slowly toward each other and stop about 20 feet apart. Quickly, they rise into the air and fly at each other at full speed. In mid air, about six to eight feet off the ground, the birds tangle together at beak and foot. Suddenly, they break apart and fly back to their starting places, only to repeat the showy routine after a short rest.

The bittern is a unique singer; sucking in air and lifting its head, a bittern starts with a few short notes that sound something like a hiccough. After the lungs are full, it belts out: 'Plunk-alunk.' The pumping sound has earned the bittern the nickname of 'thunder pumper.' Since the thudding voice, heard from a distance in the early morning and early evening, sounds like a stake being driven into deep mud, a second name for the bittern is 'stakedriver.'

American bitterns have become rare in Illinois because so many marshes have been drained to make way for roads, houses, shopping centers and cropland. When a marsh is drained, the creatures that call it home usually cannot find another nesting shelter. As a result no young are raised to carry on. To aid bitterns and other marsh inhabitants, marshes in Illinois should be preserved.

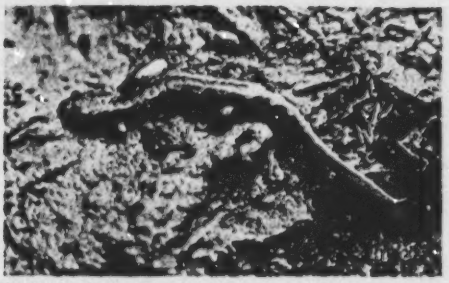
KANKAKEE MALLOW

Kankakee mallow bears a strong resemblance to the hollyhock you might have growing in your garden. Belonging to the same family, both plants are known for their tall, many-leaved stem and grand showy flowers.

Only two populations of Kankakee mallow are known to exist in the world. One is on Peter's Island in Virginia and the other is found on a small bedrock island in the Kankakee River in Kankakee County. Growing on the small cliffs and in the abandoned farm pastures of Altorf's Island, Kankakee mallow thrives in good numbers alongside Carolina rose, redbud, gooseberry, hickory and St. John's wort. Mainly because of the Kankakee mallow's presence on the island, Altorf's was one of the first natural areas in Illinois to be brought under the protection of the Illinois Nature Preserves System, and today is known as the Kankakee River Nature Preserve.

On both sides of the island, the low limestone bluffs are decorated with the large purplish flowers of Kankakee mallow. The blossoms, which bloom in June, are ready to bring forth their fruits by August. Tucked within each flower, a capsule-shaped green fruit about the size of a quarter is turning brown with ripening seeds. Old empty fruit skins scattered about the

BALD EAGLE



DUSKY SALAMANDER

DOUBLE-CRESTED CORMORANT

Waning Wetlands Support Some Of 'These Precious Few'

BLACK-CROWNED NIGHT HERON

KANKAKEE MALLOW

LITTLE BLUE HERON

COMMON GALLINULE

HIGGINS EYE
PEARLY MUSSEL

LAKE STURGEON

ground are last years evidence that the fruit soon will open and scatter its seeds to the wind.

Botanists will continue to monitor the habitat of the Kankakee mallow to insure that it continues to reproduce at a healthy rate. More and more plants are growing in the old farm fields each year, even though the fields, are beginning to grow up in bushes and small trees. However, if the mallows are to linger there in the years to come, these upland pastures will have to be managed as open areas.

HARLEQUIN DARTER

Harlequin darters are among the rarest of the 148 species of darters. An uncommon fish in the southwestern United States, the harlequin darter was discovered for the first time in Illinois in 1964. Found along a 20-mile stretch of the Embarras River in Cumberland and Jasper counties. harlequin darters never have been found elsewhere in the state. Preferring to live in clean water moving swiftly over a sandy bottom, harlequin darters make their home in piles of drift logs, sticks and other debris.

A handsome fish, the reddish tan harlequin darter grows to be from one and one half inches to three inches long. Across its back are stripes and blotches that are brown in the summer but bright green in the winter. Very little is known about the breeding habits of this fish, but biologists believe the male keeps his bright green stripes through the spring and summer season. As if dressed royally for the occasion, the male also wears a bright red-orange band through his first backfin.

No other Illinois river is suited so well to the needs of the harlequin as is the Embarras. The water is clean and clear and the wooded areas along the river provide the sticks and leaves into which these darters like to tunnel. Yet today the river is

HARLEQUIN DARTER

threatened by growing silt build-up and pollution from agricultural chemicals and insecticides.

The Embarras should be kept free-flowing and as clean as possible to protect not only the harlequin darter, but several other rare animals that find refuge in its waters.

DOUBLE-CRESTED CORMORANT

Black and gleaming with oil, double-crested cormorants appear to be covered with scales as they sit perched in dead trees. Looming forward on webbed feet, they coil their necks back holding open pairs of arched wings. Their long hook-tipped beaks cut by sharp jagged edges, they seem like animals left over from the prehistoric past. However, there is nothing mysterious about these creatures, they're just bathing in the sun along the Mississippi River, opening their wings to dry.

Cormorants occupy many parts of North America. They require waterways for fish feeding, and rocks, cliffs or trees for nesting. If a tree is not dead when a colony of cormorants move in, it soon dies from the bird droppings. In Illinois, cormorants nest in three dead trees sitting in the Mississippi River in Carroll County. Several years ago, biologists determined that these trees eventually would fall into the water or be sheared off by floating ice, eliminating the only known nesting site for cormorants in Illinois. During the winter of 1976, a telephone pole rigged with wooden nest platforms was installed in the river near the dead trees in the hope that the cormorants would switch over to the 'artificial tree' for nesting. During the late spring of 1980, 36 cormorant nests were counted at the site, including ten nests on the artificial tree.

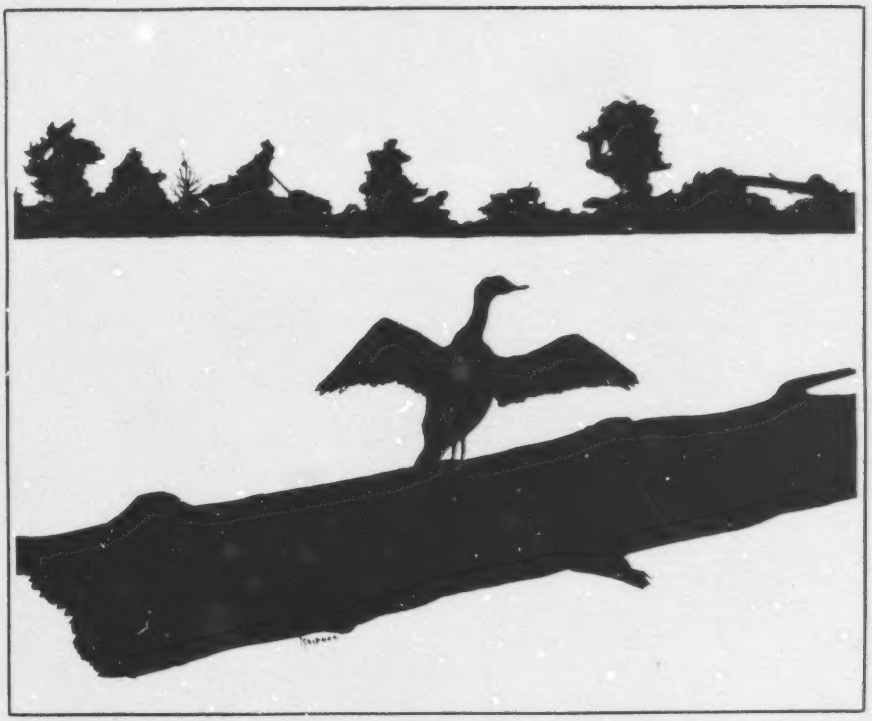
Cormorants arrive at the Carroll County site each April and quickly begin courtship activities. Beating the water wildly with their wings, the courting birds attempt to impress each other by paddling along the surface, diving underneath, surfacing, spinning about wildly and playing catch with floating debris.

The female cormorant builds a well-made nest of sticks and weeds. When one bird comes to relieve the other on the nest, the incoming bird bows royally to its mate, and both birds step off the nest. Using a series of snakelike movements, one bird winds its long neck totally around its mate, caressing it from head to tail until the pampered partner settles down onto the nest. The young, when first hatched are naked, blind and so helpless they cannot lift their own necks. Within a few days, they are covered with a jet black down that attracts and absorbs heat so strongly that the young are easily scorched if not constantly shaded by the adult. At first the young birds drink fishy soup from the adults beak, but after a few weeks they can reach down the adults throat for larger bits of fish. When the young are fully feathered they take to the water. Soon an opening in their nostrils closes so that they can dive beneath the water. A young cormorant can catch fish and swim before it can fly.

A fishing cormorant sits low in the water, then turns tail up and dives deep and stays under water for a long time. With its long slender body and powerful, webbed feet, the cormorant easily outswims most fish, especially when it flaps its wings and 'flies' underwater. Surfacing with a fish

caught sideways in its beak, the cormorant tosses the fish about until it lands headfirst in its throat so the fins do not tear the cormorants throat. When leaving the water, a cormorant spatters across the surface like an overloaded plane trying to pick up speed for take-off. Towards the end of the summer, the young birds join the adults in a V-formation and the birds wing a slow, heavy flight to the south Atlantic or Gulf Coast for the winter.

Success with artificial nesting structures at the Carroll County colony has been so encouraging the U.S. Fish and Wildlife Service has erected three more structures in the river. A pole already has been installed at Shabbona Lake where cormorants have been reported but not seen nesting. Biologists hope that a combination of nesting poles and protection for their habitat will strengthen the nesting population of double-crested cormorants in Illinois.



DOUBLE–CRESTED CORMORANT

BIGEYE CHUB

The bigeye chub is distinguished by its unusually large eyes and a black stripe running from head to tail. Because it depends on its great eyes to find food, this chub must live in sparkling clear water, bedded with clean sand or fine gravel.

Massive amounts of soil runoff from farmlands into streams have ruined much of the habitat of the bigeye chub throughout its central and eastern United States range. Covering the bottom with layers of silt, these runoffs reduce the amount of dissolved oxygen in the water and muddy the water, making it hard for the bigeye to see the tiny invertebrates it feeds upon.

Once an abundant fish in southern and eastern Illinois, the bigeye has been found in recent years only in the Salt and Middle forks of the Vermilion River. In fact, this fish may be gone from Illinois. No specimen has been found since 1961. Bigeyes still are found in two states bordering Illinois, living in some clear streams in Indiana and in Ozark streams of Missouri.

In addition to pure water, ideal bigeye chub habitat must have a healthy supply of aquatic vegetation. These plants attract insects for fishes to feed on. Though the bigeye usually lives near the rapids of a stream, it avoids the direct current, keeping more to the gently rippling areas.

Bigeye spawn in late spring or early summer. The slender, silvery minnows grow to a maximum of about three inches by the end of their second summer.

High quality water conditions will have to be restored to our streams, especially the Vermilion, Embarras, and Little Wabash rivers, if the bigeye chub is to make a comeback in Illinois. It will be especially important to continue and expand the soil conservation efforts currently being practiced by many farmers in order to curb the harmful effects of soil runoff.

BLUEHEAD SHINER

The bluehead shiner was discovered in Union County's Wolf Lake in the mid-1950's. It was the first time that this fish had been recorded anywhere in the world.

Tragically, Wolf Lake has since become an environmental catastrophe. On two occasions since 1974, railroad cars moving along the edge of the lake have overturned and dumped deadly chemicals into the water, causing massive fish and vegetation kills. In 1975, a waste spill from a powder company further polluted the lake. Since these accidents, fish biologists have been disappointed in their efforts to find the bluehead shiner.

Biologists believe that a small community of bluehead shiners may still be alive in Wolf Lake. It is probably the last remnant of a once widespread population which eventually died off as the environment changed. The unique habitat of Wolf Lake and the lack of human interference prior to the

pollution spills are keys to the tiny fish's survival there.

Wolf Lake is an oxbow of the Big Muddy River. The 1,000-year-old lake is long and narrow, and is thick with lily beds and American lotus. There are no cypress and tupelo, which are common plants in other local lakes which do not have the bluehead shiner.

Fortunately the blue-capped, minnow-sized shiner now has been found in Arkansas, Texas and Louisiana. Biologists theorize that if more lakes with habitat like Wolf Lake's are studied, new populations of the bluehead will be found in Missouri, Kentucky and Tennessee.

Biologists need to find specimens of the bluehead shiner in Wolf Lake in order to learn more about the fish's life requirements. While finding a bluehead might help biologists determine what is needed to save this fish, biologists are worried that their efforts to net a specimen have failed simply because they have not searched the deep waters of the lake. Future efforts to search for the bluehead shiner will be concentrated in the deepest parts of the lake to find this rare fish.

BALD EAGLE

In 1782, Americans chose the bald eagle to symbolize their nation. The Illinois school children of 1976 must have believed they were helping to carry on the dream of their ancestors when they contributed their pennies, nickels and dimes to help buy the Oak Valley Eagle Refuge in Rock Island County and the Prairie State Eagle Refuge in Hancock County.

More bald eagles spend the winter in Illinois than in any other state. During 1978, more than 1,400 bald eagles were counted along the Mississippi and Illinois river valleys and on wildlife refuges in southern Illinois. The best way to spot bald eagles is to look for their snowy heads dotted high in the trees along waterways. Here the eagles sit for hours

BALD EAGLE

until hunger compels them to look for floating dead fish or the carcasses of deer, rabbits, or ducks lying on the ice or along the shoreline. Other times, the eagles mount to the sky and scan the water for surfacing shad or other fish. Diving down, the eagle snags the fish with its talons. In January and February, when the rivers freeze over, the eagles move to areas below dams where the water is kept moving and unfrozen.

Bald eagles rarely use Illinois as a nesting ground, although nesting was common when their numbers were greater. Biologists believe that if the population of eagles increases across its range, eagles may begin nesting in Illinois again. But for the present, most of the eagles that winter in Illinois leave for Wisconsin, Michigan, Minnesota and Canada for the nesting season.

Eagles mate for life and use the same nest for many years. A typical bald eagle nest is big enough for a couple of men to stand in. The two to three eaglets, hatched in April or May, are covered with down, but the young birds quickly put on mottled brown feathers. It will take three years for the juvenile birds to grow the majestic plumage of the adult with a bright white head, and tail.

Only one or two of the strongest eaglets survive. Their time in the nest is full of play and exercise, walking and jumping about, and learning to use their talons by picking up and tossing sticks. Gradually, the young begin to jump above the nest a few feet and spread their wings. As the days pass, their jumps get higher and higher and their wingspread gets closer to the seven foot spread of the adult. Finally an adult bird hovers high over the nest with a taste-tempting fish. The eaglets jump high for it and end up opening their wings and following their parent in graceful full flight.

Across the bald eagle's North American range, its problems are many. Their habitats have been disturbed or ruined by construc-

tion and human activity. The pesticide DDT is banned now, but in some parts of the country DDT still works its destruction upon eagles, killing many birds and so completely robbing others of their calcium supply that their eggs often are too fragile to keep from cracking.

Since Illinois is fortunate to host so many of the eagles during the winter, many Illinoisans feel we have a national responsibility to protect the bird. Most important, eagle refuges in Illinois must be protected from disturbance because the birds will leave if bothered. Careful monitoring of water pollution and the use of pesticides also is needed. In addition, citizens and law enforcement officials can cooperate to stop illegal shooting and trapping of the bald eagle.

BLACK-CROWNED NIGHT HERON

Black-crowned night herons live in most of North and South America. The bird takes its name from feeding mainly under the cover of darkness. Squawking in full cry as it flies about, this small, stout heron claims nicknames such as Quawk, Squawk and Qua bird.

Rare in Illinois, night herons nest in a few colonies in the northeastern and central parts of the state. Nesting colonies are called heronies or rookeries, and can be found in bottomland forests near water or in marshes.

Food-gathering spots such as ponds or lakes must be nearby. At the Illinois rookeries, which can be shared with other herons and egrets, a couple hundred adult and young herons crowd the limbs of small shrubs and trees.

Amid the sour aroma of rotting fish and bird droppings, the month of June in a heron rookery abounds with the sounds of mottled brown youngsters. Bouncing about in their loosely built stick cradles, the young birds impatiently await the return of the hunting adult. Croaking softly, the older bird returns and stands on the edge of the nest. Raising its black crest, the adult fluffs out its feathers, halfway spreads its wings, shakes its body and regurgitates a fishy lunch for the youngsters. If the young are very small, the adult first digests the food, then using its beak like a bottle, pours fishy soup into the mouth of the young bird. At two to three weeks of age, the young birds clamber out onto the branches. Though they are skillful climbers, an over-confident young bird sometimes will slip and become helplessly caught in a bind of branches.

Black-crowned night herons fish in a different sort of way from other herons. Instead of waiting motionless for prey, night herons stalk about, briskly scouring the water for a victim. A quick sweep of the curved neck, and the heron vacuums up a fish or frog.

Night herons also are faster, more graceful flyers than most herons. In flight, they can sail as smoothly as gulls and soar to great heights like hawks. Towards the end of the breeding season, herons are ready to put their flying talents to test. Scattering away from the rookeries in late summer and fall, the herons search for new feeding spots and eventually wing their way into the southern United States and South America for the winter.

Black-crowned night herons once nested commonly throughout Illinois. Though the birds have natural enemies such as hawks and raccoons, their greatest foe has been man. Urban development has ruined many feeding and nesting spots. These birds also are threatened by the use of pesticides. Senseless harrassment of the birds continues at one or more of the rookeries left in Illinois. Survival of these herons in the future will depend on protecting their habitats from construction, pollution and human activities.

BROAD-BANDED WATERSNAKE

The broad-banded watersnake is found from the Gulf of Mexico up the Mississippi River to Horseshoe Lake in southern Illinois. No snakes have been sighted at Horseshoe Lake and nearby ponds of Alexander County during the past 20 years, but biologists are hopeful that the snake still is there.

The broad-banded watersnake is identified by the wide dark bands wrapped around its yellow to red-brown body. The snake has a triangular head and a hefty body. Females give live birth to 10 to 15 wriggling young in late summer.

The bones in the head and jaw of the broad-banded water snake are loosely fitted to allow the mouth to stretch widely as the snake gobbles down its food whole. A great swimmer, the snake easily can catch frogs, salamanders, crayfish and fish.

Many people resent the snake because they figure it kills too many fish. However, broad-banded snakes, like most other snakes kill mostly weak and sick fish. Doing this, they help keep fish populations in control, and rid the fish population of contagiously sick members.

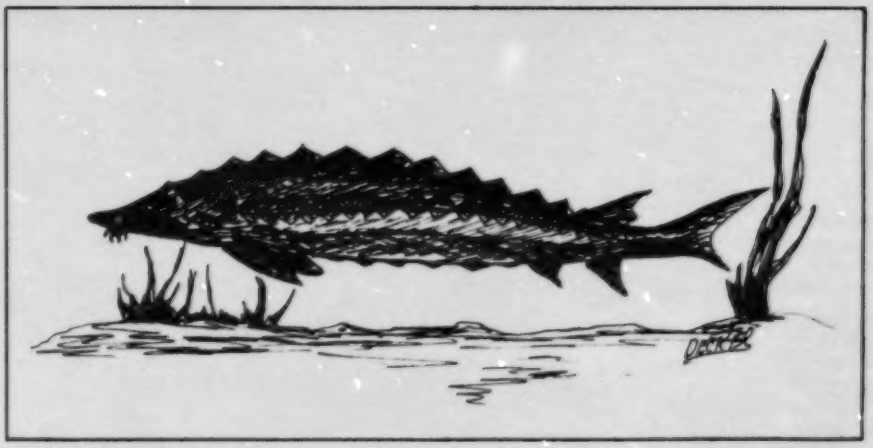
The broad-banded watersnake often is confused with the poisonous cottonmouth. However, the broad-banded snake is harmless. If a human attacks this snake, the bite it inflicts may be painful, but it is all in self-defense. The real preference of the broad-banded snake is to peacefully bask in the sun on a floating log, and slink into the water without a ripple or sound if a human, or predator approaches.

The recreational use of Horseshoe Lake probably is one reason why the broad-banded watersnake has all but vanished there. The Department of Conservation is working to make the popular state park a popular spot for recreation, but also a safe area for fish and wildlife. By managing the area to suit man's needs, as well as those of other life forms finding refuge there, the broad-banded

watersnake can be assured a suitable home in Illinois. Even if only a few snakes are left, they can, with the aid of a healthy habitat, keep a foothold in Illinois and possibly make a comeback in the future.

LAKE STURGEON

Belonging to a group of primitive fishes that evolved about 300 million years old, sturgeon always has been highly prized by man. In ancient Rome, sturgeon was reserved for the grandest banquets and Henry I of England banned the eating of sturgeon at any table except his own. The early American colonists put up thousands of kegs of cured sturgeon each season, and today, sturgeon flesh still is highly sought and sturgeon eggs are desired the world over as caviar.



LAKE STURGEON

Lake sturgeons range across central Canada and down a broad triangle to Alabama. Once common in Lake Michigan and in the large rivers of Illinois, several environmental problems have caused lake sturgeons to become extremely rare in Illinois. Water pollution and heavy siltation have driven sturgeons from the rivers and lakes where they once fed over the clean sandy bottoms. Man-made dams have blocked their passage to spawning grounds, and sturgeons have suffered from over-harvest by commercial fishermen. Over-harvest is especially harmful because adult sturgeons cannot reproduce until they are 15-20 years old. If too many older fish are taken from the water, re-population is hampered.

Growing to a maximum of eight feet and a weight of 310 pounds, this fish slowly swims a few inches above the bottom. Dangling from its long snout are four fleshy barbels. These sensory organs aid in feeling out morsels of food. Once a target is located, the mouth puckers up, pushes forward and sucks in worms, clams, snails or insects.

Lake sturgeons often swim upstream in late spring to spawn. During the mating ceremonies, the fishes frequently jump out of the water, splashing and twirling about in a noisy display. The female rubs her belly over rocks and stumps to force her eggs out. A mature female may lay as many as 885,000 blackish eggs, each one enclosed in a sticky envelope that adheres to nearby objects. After the male swims over the eggs and fertilizes them, the eggs hatch in just five days. The tiny larvae which hatch are less than one-half inch long.

Cleaning up our water is the key to preserving the lake sturgeon and all other fishes in Illinois. We also need to review carefully any plans to channel, dam or change in any way the natural flow of our lakes and rivers.

HIGGIN'S EYE PEARLY MUSSEL

During the winter, when the water is low or when its habitat is threatened physically, a Higgin's eye pearly mussel 'clams up,' refusing to grow. Upon the return of fair conditions, the mussel breaks its rest period and as it begins to grow its shiny, porcelain colored shell, a heavy black line is formed from deposits of lime.

The Higgin's eye pearly mussel is a rarely found native of the Illinois and Mississippi Rivers. Before these rivers were tampered with by man, Higgin's eye resided commonly in these rivers' northern reaches where it survived by filtering tiny bits of organic material from the water. When these rivers were locked and dammed, their northern portions became more like lakes than rivers. As a result, the currents in these areas changed from fast-moving to sluggish, and the slow-moving currents could no longer maintain the habitat needed by the Higgin's eye pearly mussel.

The life cycle of the Higgin's eye involves many stages. Mussels do not reach sexual maturity until they are four or more years old. At that time, a male mussel releases sperm into the water. Somewhere downstream, a female draws water laden with sperm into her incurrent opening or siphon. The sperm meets her eggs on her gills and here the fertilized eggs develop into unique larval forms known as glochidia. These tiny larvae are shaped like a miniature replica of the adult. But the glochidia are different from the adults, lacking a heart, liver, digestive tract and other organs. When the gills of the female become 'gravid' or bursting with mature glocidia, she is ready to release them.

Since the glochidia cannot swim or crawl, the female Higgin's eye has developed a remarkable way of sending them on their way. She opens her shell slightly and sticks out two fleshy flags of tissue. Each flag has a black dot

on one end and when the female moves them around, they look like two tiny fish battling the current. When a fish strikes at the mock fish, the female snaps her shell, squirting a stream of glochidia about and into the mouth of the fish. The fish now will serve as a host for the still developing larvae. However, not all fish are right for the larvae of Higgin's eye. If the larvae are to survive, a sauger must be the fish to receive them. The glochidia attach themselves to the fish by clamping down the edges of their shells to the gills or fins of the fish. Soon the tissue of the fish builds up around the glochidia forming a cradle-like cyst wherein they begin to grow. Feeding on the tissue of the fish, the glochidia develop their vital organs and feet.

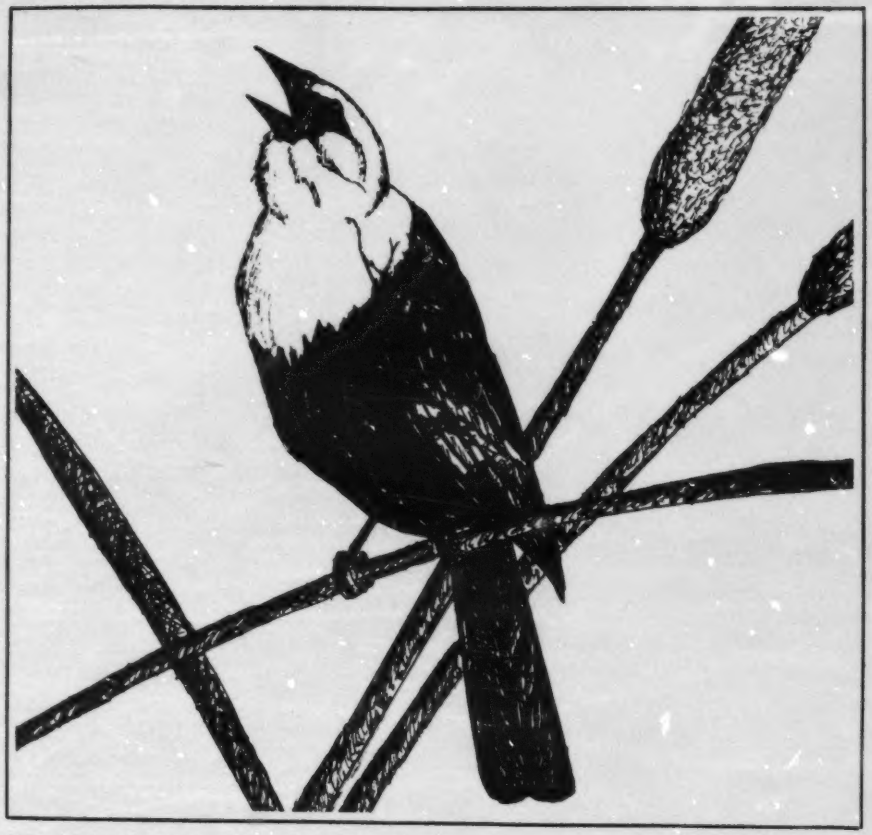
After several weeks the glochidia, drop from their host to the bottom of the river, and become free-living mussels.

The U.S. Fish and Wildlife Service has formed a Upper Mississippi River Bivalve Recovery Team to develop a restoration plan for the Higgin's eye and other endangered mussels. As a member of that team and through efforts of its own, the DOC will be working to protect areas of suitable habitat for the Higgin's eye pearly mussel.

YELLOW-HEADED BLACKBIRD

Despite the elegant plumage of the male yellow-headed blackbird, it sounds out over marshes with rasping croaks and squeaks in crude contrast to the sweet song of its cousin and marsh roommate, the red-winged blackbird.

Yellow-headed blackbirds once nested fairly commonly within the marshy regions near Chicago, but nesting colonies now are found only occasionally in Lake, Cook, McHenry, Rock Island, and Cass counties. Yellow-heads nest only in deep water marshes because the water protects their young from non-swimming



YELLOW–HEADED BLACKBIRD

predators. The yellow-head nest is fastened to cattails about one to three feet above the water. Woven of sedge grass, the inner cradle of the nest is padded with finer grasses for the three to five young.

Yellow-heads feed on plants and insects that live in the marsh. In the fall, however, the birds venture out onto nearby fields and eat leftover grains and seeds and do the farmer a favor by eating many of the insects that plague cropstands.

Even though yellow-headed blackbirds nest in colonies, each male bird vigorously defends his own nesting territory, sometimes a space as small as a clump of cattails. Two males pace along the imaginary fence-line of their territories like feuding city neighbors. One bird will fly at another, flapping his wings violently and sticking his bill straight up in the air to issue a warning. The birds seldom attack, but if they do, one pins the other down and pecks at him--usually for no more than about 30 seconds.

The recovery plan for the yellow-headed blackbird calls for preserving their favored habitat, the deep-water marshes.

ALLIGATOR GAR

Alligator gars live from the Gulf of Mexico to southern Illinois in backwaters, lakes and bayous along the Mississippi River basin. Gars are an ancient group of fishes with fossil forms recorded that are at least 100 million years old. The alligator gar is the largest of the gars, growing up to 10 feet long, and weighing 300 pounds. This freshwater giant has a broad snout and heavily toothed jaw, like that of an alligator.

The last two records of this gar in Illinois were recorded in backwaters of the Mississippi River in Alexander County and in Randolph County.

An extremely fierce hunter, a gar skims close to the surface of the water, with its ram-like beak aimed at a school of small fishes. Propelling itself with its fins, the long, slender, brownish or olive green fish looks very much like a drifting stick or log. Surprising its victim, the gar lunges sideways and takes the smaller fish between its jaws.

Gars are able to stay near the surface partially because they have an oxygen rich swim bladder. This bladder also helps them to breathe air much like animals with lungs, enabling them to survive in still waters where there is little oxygen.

Gars spawn in shallow water during the spring. Female gars lay hundreds of gummy dark green eggs which stick to weeds and other objects. After hatching, young gars attach themselves to vegetation by means of a suction device on the ends of their snouts. Both young and adult gars occasionally break the surface to expel waste gas and swallow air for the swim bladder.

Since alligator gars compete with man for some of the more tasty fish, many people see this gar as a nuisance. However, alligator gars help maintain a natural control over growing and unbalanced fish populations. Gars need undisturbed, quiet backwaters along major rivers in Illinois. If the Mississippi and Illinois rivers are channeled to make room for heavy barge traffic, suitable backwater areas will disappear. The best chance of keeping the alligator gar in the state will be to avoid changing, overusing, or polluting the state's large rivers.

LITTLE BLUE HERON

Little blue herons are found in or near wetlands throughout the southeastern United States and in Central and South America. From the southern U.S. coast, little blues range westward to the Gulf of Mexico and up the Mississippi Valley to southern Illinois.

Though fairly good numbers of little blues migrate through Illinois, only one breeding colony or 'rookery' is known to exist in a wooded tract of Madison County. Two hundred little blues have been counted at the rookery the herons share with two other endangered birds, the snowy egret and great egret.

Flocks of little blues arrive at the rookery each spring. Bowing from the uppermost limb of a tree, a male little blue heron greets a female in courtship by dancing from branch to branch toward her, courtseying with wings half spread, and curving his long neck and raising a fan of plumes behind the shoulders and neck. Uttering a special cry, he performs a 'greeting ceremony' that both sexes carry out each time they meet. After mating, the pair of little blues sit side by side, one resting its head peacefully on the others flanks. Shortly thereafter each pair begins to construct a nest in a small tree. The male collects small sticks and brings them to the female.

During the incubation period, herons take turns sitting on the eggs. After one bird is relieved from the nest, it goes to fetch several sticks and returns to give the sticks to its mate. The brooding bird builds the sticks into the nest while it sits, wasting no time before the hungry chicks hatch.

The young are covered with pure white down and soon begin to grow white feathers. In this plumage, the young herons closely resemble snowy egrets. It will be two years before they wear the deep blue and maroon plumage of the adult birds. At 30 days of age, the young scamper onto the nesting tree branches, climb about, and drop to the ground to begin learning how to hunt for food.

Each morning, little blue herons leave the Madison County rookery to search for waterways where they can find food. Most

LITTLE BLUE HERON

often, the herons settle into bottomlands along the Mississippi River and around Horseshoe Lake. The little blue stalks the water's edge in silence, searching for prey. Each step is carefully measured as the heron's keen yellow eyes scan the shallows for a fin, foot or wing. Suddenly the bill dashes foward and pierces a fish, frog or insect. If more prey is about, the little blue runs briskly through the water snagging up more food with each stride.

By mid-summer, the herons are anxious to find fresh hunting grounds and since the young now are able to fly, they break camp and migrate northward. Possibly because the youngsters do not know from past years the location of the best feeding spots, they migrate farther than the adults. At the first threat of cold weather, the herons fly south for the winter.

Little blue herons are shy and retiring. Rookeries at several locations in Illinois have been abandoned after civilization encroached on the heron's private way of life. The current nesting site in Madison County and the feeding stations along the American bottoms must be protected from human interference if the little blue heron is to continue raising its young in Illinois.

Habitat Havens For Unique Species

Beaches, dunes, cliffs, bluffs and caves are uncommon in Illinois. Because they are unique, they provide habitats capable of supporting unusual plants and animals. Bird's eye primrose, dune willow, eastern woodrat, Indiana bat and peregrine falcon are just a few of the special species that find homes in these habitats. In addition to being unusual, these habitats share a common bond--they all are pretty rough places to live. The species that inhabit them have adapted to living in such austere surroundings, but many have failed to adapt to changes brought about by man.

In Illinois, beaches and dunes are found along the Lake Michigan shoreline. The overall shoreline habitat is comprised of three parts, the beach, primary dune and tertiary dune. The beach is the sandy stretch of sand, free of vegetation, running closest to the water. The primary dune is the ridge of sand, bedded by grass and stubble, immediately beside the sandy area and towards land. The tertiary dune is closer yet to the mainland and has a sparse to dense cover of low shrubs, trees and grasses. Both types of dunes are formed by wind blown sand and sometimes are relatively steep on their land-facing side. The shoreline habitat of beach and dune provides a habitat that is open to the sun and wind, but close to the resources of the water and the cover of the dunes.

Cliffs and bluffs appear throughout Illinois. Cliffs are the steep, outermost face of bedrock mounds and hills. Cliffs in Illinois usually are either sandstone, limestone or dolomite cliffs. Sandstone cliffs are abundant in the Shawnee Hills and are scattered generally throughout the rest of the state. Limestone cliffs occur throughout Illinois where bedrocks crop out, but they are most commonly found along the Illinois and Mississippi rivers. Dolomite cliffs are almost entirely limited to stream valleys in the northern part of Illinois. Whatever their type, cliffs have little or no soil. On the other hand, bluffs have good beds of soil and loose rocks. These steep slopes graciously overlook many of the rivers, lakes and streams of the state.

A cave is an underground crevice, usually not penetrated by sunlight, and large enough for at least one person to enter. The environment inside a cave is ideal for hibernating species, such as bats, because the temperature

beneath the earth's surface remains constant. The largest cave systems in Illinois are in St. Clair, Monroe, Randolph and Jackson counties, but caves also are common in the Shawnee Hills and along the Mississippi and lower Illinois rivers. Caves that have formed in limestone and dolomite are the biggest and most common caves in Illinois.

Beaches, dunes, cliffs, bluffs, and caves are not always the easiest places to live. Beaches and dunes continually are threatened by erosion, flooding, and strong winds, plus problems arising from off-road vehicle traffic, housing and commercial development and heavy recreational activities. Ironically, the natural erosion and flooding that formed cliffs and bluffs will be their demise. Bluffs often are put into pasture and this increases the rate of erosion. Furthermore, cliffs and bluffs are some of the most scenic spots in Illinois and they often are developed into home sites or visited by horse riders, motorcyclists and hikers who sometimes unintentionally damage the fragile environment. Caves are subject to infrequent cave-ins, but their greatest enemy has been the activities of man, mainly mining and the sport of spelunking.

Yet, despite their woes, beaches, dunes, cliffs, bluffs and caves all are special natural areas in Illinois, each a unique, delicate environment capable of giving a home to some of our most specialized plants and animals.

BIRD'S EYE PRIMROSE

At first glance the blossom of bird's eye primrose looks like that of a daisy. Pink or white petals encircle a round yellow dot, called the "bird's eye." The slender stem sprouts from a rosette of green leaves and rises to a height of only three to five inches. Along steep cliffs, bird's eye primrose does not grow upright toward the sun, rather it shoots out from the cliffside at a right angle.

Bird's eye primrose is a northern wildflower, growing on the tundra of Alaska and in the chilly regions of northern Canada. The plants range into the United States only as far south as the Great Lakes region. In Illinois, bird's eye grows along the walls of Apple River Canyon, a unique river canyon in JoDaviess County.

In summertime, the Apple River is little more than a stream trickling between steep, 50- to-75-feet, canyon walls. Hundreds of bird's eye primrose plants growing in long, narrow strips decorate the cliffsides. The plants grow in these strips, sometimes only a few inches wide, because that is where alkaline water is seeping from the limestone walls. This moist alkaline habitat provides an ideal growing place for the plants. The soil is extremely shallow in these strips but the tiny bird's eye primrose finds plenty to meet its modest needs. In fact, the shallow soil works to the primrose's advantage. Since larger, more dominating plants in the area cannot survive in the shallow soil, the habitat is especially suited and is free from competition for the bird's eye.

Bird's eye primrose appears in the canyon in late May and flowers until the end of July. Its delicate flowers are pollinated by insects which are attracted to their beautiful, yet simple display. After pollination, the ovary of the flower grows into a brown cylinder-like fruit.

Towards the last days of summer, five valves at the top of hard, spotted fruit open and the ripened seeds within are free to leave. If the seeds were heavy, gravity would send them sailing down the cliffside into the water. Fortunately the seeds are extremely lightweight and they settle down around the base of the parent plants.

Apple River Canyon is classified by the Department of Conservation as an especially valuable natural area because of the animal and plant life finding refuge there. Most of the canyon in which bird's eye primrose grows is protected within the Apple River State Park and botanists will continue to monitor their living situation to help the tiny wildflower survive in Illinois.

JEWELED SHOOTING STAR

Jeweled shooting star should not be confused with its look-alike and close relative, the common shooting star. Jeweled shooting star has a frail fruit, while common shooting star has a tough one. The flowers of the two plants differ in color also. But the most important difference between these two Illinois wildflowers is that the common shooting star is found readily, while the jeweled one rarely so.

The distribution of jeweled shooting star is widely scattered across the eastern half of the United States. At each location the plant grows near a major river, in Illinois, the Mississippi. Its presence near rivers is due to its preference for growing along cliffs and bluffs that girdle such waterways. Small populations of jeweled shooting star grow along the moist, mossy bluffs overlooking the Mississippi River in northwestern and west central Illinois. The plants grow in areas of the state that are classified by geologists as "driftless areas," meaning that the areas that escaped glaciation during the Ice Age. Jeweled shooting star and the other rich flora living in "driftless areas" are millions of years older than the flora living in parts of Illinois that were once covered with ice and have had vegetation sprout up since then. Because of their advanced age, plants from "driftless areas" are very important to scientists who study the ecology, genetics and distribution of plant life.

Clusters of jeweled shooting star bloom in early spring. The showy blossoms appear to be arranged inside out. Normally the

JEWELED SHOOTING STAR

stamen and stigma of a flower are tucked inside a cup of petals, but in the case of the jeweled shooting star, five stamen reach forward while the petals of the flower fall behind and reach in the opposite direction.

When a pollen-laden insect visits a flower, it lands on these stamens and pollen either falls or is rubbed by the insect down toward the base of the petals where the ovary is hidden. Following pollination, the ovary grows into a brown paper-thin fruit. When the matured fruit opens in late summer, tiny seeds are released. Despite their small size, the seeds are relatively heavy and normal wind cannot carry them far. Usually they settle around the ankles of the parent plants, but sometimes they are swept down the cliffside by a rain. Jeweled shooting star grows for the most part on privately owned land in Illinois. In the future, botanists from the Department of Conservation will be available to help landowners manage the bluff-side habitat of jeweled shooting star in order to keep this flower in Illinois.

INDIANA BAT

Indiana bats use two very different 'homes' during the year. During the summer they nest under the bark of trees, and throughout the winter, they inhabit limestone caves.

Just inside the mouth of an abandoned limestone cave in LaSalle County, the only colony of Indiana bats in Illinois settle down for a period of hibernation lasting from about September to April. Before the bats bed down they build up several layers of fat, sometimes as much as a third of their body weight, to tide them over the winter. The bats hang together in clusters and seldom move. As long as the temperature stays between 35 and 40 degrees above zero, the bats sleep soundly, breathing only once every five minutes. In this drowsy condition, the bats are helpless and if they are plucked down from the roof of the cave by a human, they can barely move. It takes about 15 minutes of squeaking, stretching and trying to bite the attacker before the bat can perk up enough to fly away.

When spring arrives, Indiana bats instinctively wake up and migrate to summer homes. A summer population of Indiana bats recently was discovered in Indiana, where the bats were setting up a nursery for their young underneath the loose bark of a dead butternut hickory tree. The only summer records for this bat in Illinois are in Cook and Jackson counties. Biologists do not know as much about the breeding habits of the Indiana bat as they would like to know, but they are certain that the bats like to settle during this time into woodlands bordered by streams where a good supply of insects can be found.

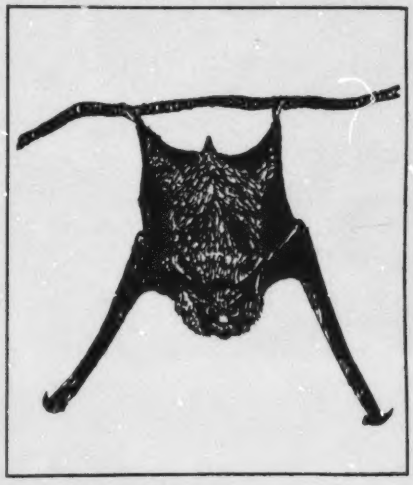
From Florida to Vermont to Illinois, this dark brown bat is battling against tremendous odds. Few, if any, of the caves the bats use are free from human invasion. Caves are being mined, explored for science and for fun, commercialized as tourist attractions, and even made into fallout shelters. All this is being done at the expense of flying mammals.

Conservationists want to save the 125 to 150 Indiana bats still hibernating in the LaSalle County mine by protecting the cave from any human activity during the winter. They also wish to work with other states to protect the summer homes of the Indiana bat. Here in Illinois, conservationists would like to develop more habitat areas in our forests to boost the small number of Indiana bats that stay in Illinois for summer nesting.

DUNE WILLOW

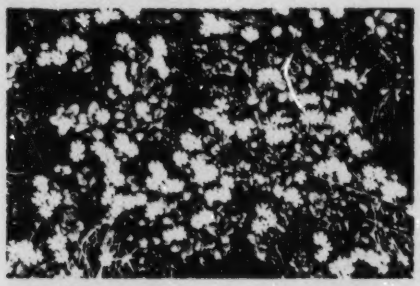
Blowing and bowing over sandy beaches is the dune willow. The stem of this wild shrub grows to a towering height of 10 feet. Clusters of small flowers borne on catkins are scattered throughout its many wide, fine-toothed leaves. These leaves are gray and hairy on the underside and are somewhat heart-shaped, especially at the base of the plant, which is why dune willow is also called heartleaf willow.

Dune willow is found in scattered locations around the western Great Lakes region. In Illinois, it grows with sand grasses and other willows along the low dunes facing Lake Michigan in Lake County. Dune willow once grew more commonly around the Chicago lakefront, but as the city

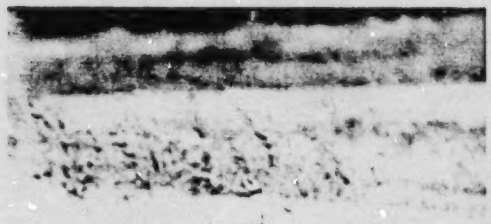


INDIANA BAT

Harsh Environments Hosts A Variety Of Special Species



BIRD'S EYE PRIMROSE



PIPING PLOVER

PEREGRINE FALCON

reached out and consumed many of the natural sand areas, this plant and others have nearly disappeared. Soil erosion also has played a part in the plant's demise. One entire population of dune willow was wiped out when a sand dune eroded and slipped into the lake at Lake Bluff in Lake County.

Buried in the moist sand, the roots of dune willow sprout up new shoots in the spring. Flowering by May and June, the blossoms pollinate themselves with the help of gusty lakeside breezes. Male flowers hold a pocket of pollen while female flowers cradle tiny future seeds. These seeds wait for pollen in order to grow. When the wind blows pollen from the male flower to a female, pollination is accomplished, and the catkins bearing male flowers dry up and blow away. Since the wind may also blow pollen to other willows in the area, this willow can produce many mixed-breed willows.

Though only about 15 or 20 dune willow plants survive in Illinois, many of these grow in Illinois Beach State Park and some may grow in a nearby nature preserve. At these protected sites, botanists will be working to preserve this woody plant by controlling sand erosion and by prohibiting vehicular traffic across the dunes.

PEREGRINE FALCON

Only 12 to 13 inches from head to tail, the peregrine falcon dives through the sky in pursuit of prey at a speed of more than 200 mph. Rapping its victim with a mighty blow from the feet, the falcon punches out its life in a flash. The prey, always a bird, whistles down through the air, dead long before it hits the ground. The proud peregrine does not stop. The confident predator will return at its leisure for the feast.

Watching the peregrine falcon perform makes this bird seem unconquerable. Yet, during the last thirty years, this powerful raptor has fallen victim to DDT, a deadly pesticide once widely used in the United States and around the world. The peregrine suffers from pesticides even though it does not eat them directly. Falcons eat smaller birds that are carrying large amounts of DDT, from having eaten insects and worms that have absorbed pesticides from feeding on sprayed plants. The situation became so bad during the height of DDT use that a fresh, clean and unpolluted home for the peregrine falcon practically was impossible to find.

Falcons died in large numbers. The ones that survived were so sick and weak that many of them were unable to nest until four to six years later. When they did nest, egg development was retarded by the pesticides, the shells so thin that the eggs simply cracked open as they were laid. The overall peregrine falcon population in North America dropped more than 50 percent from the pre-1939 population of 650 pairs. There are only twenty "aeries," places along cliffs where peregrines nest, left in the United States. A good number of these are in the western Rocky Mountains. Falcons no longer nest as they once did in Illinois. They usually are seen migrating across the state during the spring and fall.

For centuries, peregrines have been the favorite bird for the sport of falconry. When falcons became scarce due to DDT, falconry became a threat to surviving falcons when persons eager for the birds climbed cliffs and robbed nests of eggs and young.

Mankind owes the peregrine falcon a great debt. Their battle for survival is not over. Biologists in Illinois want to help the falcon return to nesting on the cliffs along the Illinois and Mississippi rivers by taking falcons that have been raised in captivity and setting them free in these Illinois "aeries."

GRAY BAT

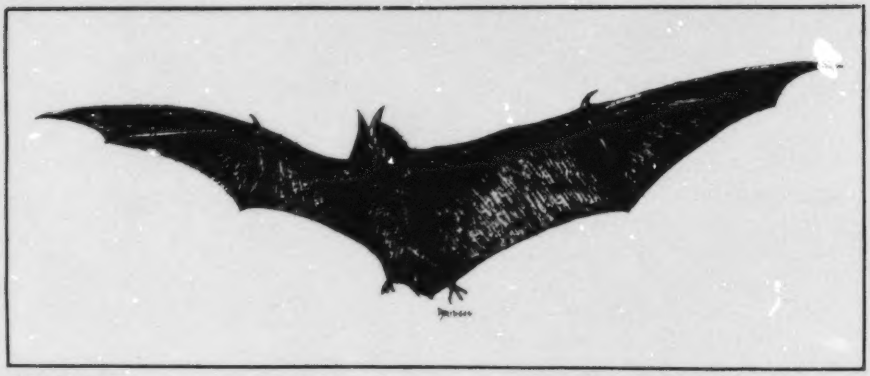
There may be many dark and wet caves in southern Illinois where gray bats spend the summer, their time for raising young--but biologists know of only one large cave in Hardin county.

Gray bats spend their summer days hanging upside down from the roof of their cave. During early summer, the females prepare to give birth by separating from the males and grouping together in a cluster known as a "maternity ward." The males are left hanging together in a "bachelor club." At the moment of delivery, the female stretches out the thin skin around her wings like a catchers mitt to snatch up the baby as it drops out head first. The tiny, naked and blind baby clings inside its mothers wing to nurse and grow. The mother is devoted and affectionate to her single young and will defend it against all forms of danger, whether it is a dog, a fox or a man. At three weeks of age, the young bat takes a few practice flights and from then on is able to hunt for insects with the adults, always at night, along stream and creek beds.

Gray bats that spend the summer in southern Illinois migrate in flocks to Kentucky caves for winter hibernation. Some gray bats from other states cross Illinois about this same time on their way to wintering caves in Missouri and these bats sometimes stop to rest in four west central Illinois caves. In 1977, mining started up again in one of these caves in Adams County and the cave quickly is being ruined as a gray bat rest stop.

The large summer cave in Hardin County also is in trouble. Quarry mining near the cave is disturbing the bats. Another threat is spelunkers, people who explore caves for sport, invading the cave during the summer, the most crucial time for gray bats trying to birth and raise their young.

Poisoning from pesticides carried on insects is yet another reason why gray bats everywhere



GRAY BAT

are losing the struggle to survive. In Illinois, the population at the Hardin County cave has dropped from 10,000 bats in 1960 to only one or two thousand bats in 1979. Alarmed over the decline, conservationists recommend that a state or federal agency purchase the Hardin County cave and the land around it. They also would like to close off the four caves in west central Illinois. Since the bats have more than one home cave during different times of the year and in different states, a cooperative recovery plan among concerned states needs to be developed and implemented to save the gray bat.

PIPING PLOVER

Most common in the eastern United States, the piping plover once nested in good numbers along the sandy beaches of Lake Michigan. Once quiet and undisturbed, these sandy beaches now are popular paths for recreational vehicles and sites for industrial development. In the bustle, the small plover has lost much of its habitat and practically given up nesting in Illinois.

Arriving on their sandy nesting grounds in the spring, piping plovers begin elaborate courtship rituals. A male bird crouches low, spreads his wings and chases after a female. Reaching her, he straightens up, puffs out his chest feathers, stretches his neck upward and beats a rapid tatoo with his feet on the sand. Both mates prepare a nest which is little more than a dip in the beach surface.

While one bird leans forward and digs up sand with its feet, the other does the same a few yards a way. Both work while whistling a short high pitched sound. When one nest is dug to their satisfaction, they abandon the other and the female lays four buffy eggs in the completed nest.

Just a few hours after hatching, the lightly tan colored youngsters scurry from the nest, their tiny legs carrying them so swiftly over the sand that they look like tufts of vegetation blowing along the beach.

Feeding on tiny aquatic animals, a piping plover runs toward the water searching for food brought in by the last wave. It then quickly runs back before the next wave can splash it. Scanning the sand for a movement, a hunting plover stands with its head cocked to one side and its neck stretched forward until it snatches a bit of worm or insect from the sand and swallows it whole.

Even when moving, the gray brown color of the plover makes it hard to spot on the beach. Instead, a plover reveals its whereabouts by singing over the crack of the waves and the whirl of the wind. It pipes a pleasing song that sounds like "peep-peep-peeplo." If a plover is sighted, it usually is bobbing along on the beach, its head toward the sand and its tail stuck upward.

Piping plovers leave their nesting grounds in mid-summer and travel to the South Atlantic and Gulf coasts of the United States for winter. Though they stay in Illinois only for a short while each year, it would be unfortunate to lose this beautiful-voiced bird from the state's greatest shoreline. To help the piping plover nest in good numbers in Illinois, nesting areas should be protected from disturbance.

At The Environmental Crossroads

Illinois was very different before the arrival of the first Africans and Europeans late in the 17th century. Human activity then had affected the state very little, and its forests and prairie appeared much as they had for many thousands of years. Its streams ran clear, and plants and animals, birds and fishes were present in great profusion and diversity.

The American Indian, for the most part, lived in a state of balance with his environment, utilizing the annual yield which nature provided without damage to the basic resources. Almost nowhere within the Illinois country was there pressure placed upon natural resources which caused species of plants or animals to become extinct or endangered.

This was soon to change. The stage was set, then, when Pere Marquette and Jolliet first explored the Illinois country in 1683, for the rapid development of a great inland empire of farms and factories, railroads and highways, and all the material developments of a complex civilization.

The forests fell as rapidly as the technology of the time permitted. The verdant prairies were turned. Towns and cities appeared, and extensive railroad and highway networks linked communities together in a way that fostered growth.

Swamps and wetlands were drained and community waste disposal and industry changed aquatic resources still further. With the growth of industry, the air became darkened and polluted, and great quantities of coal and oil were taken from the ground.

The changes, all undertaken with the best intentions, and most contributing mightily to human progress, had a profound impact on the numerous species of plants and wildlife formerly abundant in Illinois.

Many animal species found the changed environment totally inhospitable. The impact on plant species often was less dramatic, but alterations in the numbers and variety of even the smallest plants and creatures went rapidly forward.

UPLAND SANDPIPER

In the course of three centuries man moved from being simply another actor on a broad environmental stage, to the position of master and guardian of the entire environment, often with the power of life and death over its other inhabitants. In that position we find ourselves today, and we find also that we must face the fact that many species in the years immediately ahead either will decline and perhaps disappear, or maintain their numbers and even prosper or reappear, depending upon the care and attention we give the natural world around us.

We stand today at an environmental crossroads, facing great danger of the further extinction of many species. But we have the potential for preventing further loss and even for restoring many endangered species to numbers which will guarantee their continuation.

Some persons question the importance of preventing the extinction of particular species of wildlife and plants. Some species appear to have little value to us. Yet a form of life of little apparent importance may actually contain a chemical component or genetic formula which could be of great value to us in medicine, in agriculture, and in many other ways.

We must always remember that human beings are only parts of a great "web of life" that includes all living things, no matter how small and unimportant they seem to be. Once that web of life is broken by the extinction of any of its parts, the total structure is weakened, and if a sufficient number of extinctions occur, might itself collapse, leaving mankind the master of all, and ultimately, the master of nothing.

We attempt to protect endangered species in many ways. The law can require that public action, as in the building of a highway or lake, be accomplished only if endangered species are not further jeopardized. Beyond limits on public action, there is great need for private restraint and for individual concern for endangered species in all that we do.

The responsibility of the next generation in regard to endangered and threatened species is very great, for it will hold the power of life or death over many forms of life that now exist. It is the next generation and those that will follow that will be the chief beneficiaries or the losers, depending upon the success of our concern for the species which now are threatened and endangered. With proper care and attention to the world around us, we can exist in harmony with all other forms of life, and, as we do, we will benefit enormously from maintaining the web of life in all its richness and complexity.

David Kenney
Director
Dept. of Conservation

"These Precious Few" takes an in-depth look at the endangered and threatened species of Illinois fauna and flora. This booklet originally appeared as the December 15, 1980 issue of "Outdoor Highlights", official publication of the Illinois Department of Conservation.

Additional copies of "These Precious Few" are available by writing:

Department of Conservation
Forest Resources and Natural Heritage
605 Stratton Office Building
Springfield, Illinois 62706

"These Precious Few" is part of a comprehensive conservation/education kit available free to Illinois teachers. To request this kit, write to this address:

Natural Heritage Conservation/Education Kit
Illinois State Board of Education
100 North 1st Street
Springfield, Illinois 62707

"The beauty and genius of a work of art may be reconceived, though its first material expression be destroyed; a vanished harmony may yet again inspire the composer; but when the last individual of a race of living things breathes no more, another heaven and another earth must pass before such a one can be again."

—William Beebe, 1906

APRIL

ILLINOIS NATURAL HERITAGE MONTH

REMEMBER "THESE PRECIOUS FEW"

NATURAL HERITAGE MONTH:

April is Natural Heritage Month in Illinois, a time to study the natural resources of the state and to reaffirm our dual role as their guardian and partner. With the emergence of the warm wonderful days of spring, the overhead migration of myriads of colorful birds, and the celebration of several environmental observances such as Earth Day, Arbor and Bird Day and Bird Appreciation Week, there could be no better time to commemorate Illinois' living natural legacy. Though, some of the activities included in this packet center around the special days of April, these materials are always topical and can be used at any time of the year.

ABOUT THIS EDUCATIONAL KIT:

This special educational kit is designed to help teachers familiarize their students with the natural resources of Illinois. Materials in the kit are suitable for a wide range of grade levels and can be used in indoor and outdoor settings. There are fifteen versatile activities featured in the instructional guide and through the instructional guide and the color booklet, "These Precious Few", students can gain exposure to well over one hundred species of plants and animals as well as ecological systems ranging from caves to marshes.

THESE PRECIOUS FEW

A special feature of this packet is the inclusion of a color booklet, "These Precious Few". This booklet is written at an approximate fifth grade level and is intended to acquaint students with Illinois' endangered and threatened species and with the ecological conditions wherein they are existing. "These Precious Few" contains the life history of 58 endangered and threatened species, a full listing of the state's endangered and threatened species and a color poster.

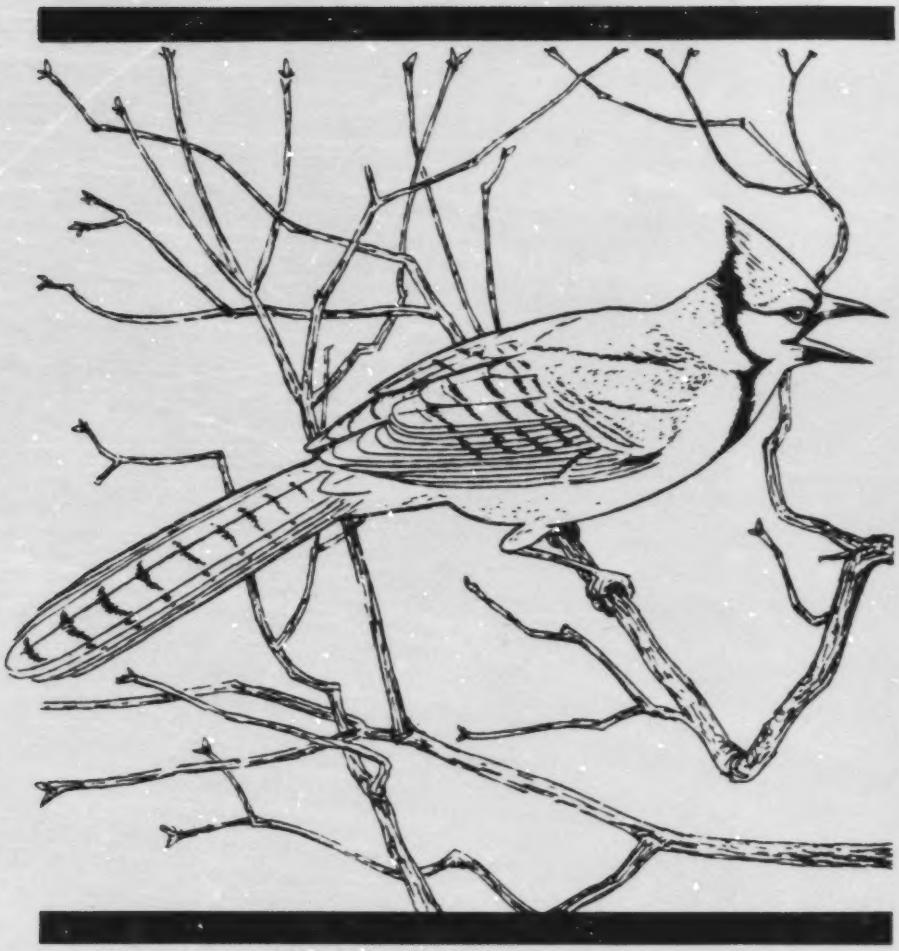
STEP INTO THE WILD:

A new conservation button, entitled "Step Into The Wild" is included in each packet. Students who complete "The Endangered and Threatened Species Word Scramble" and mail their completed exercise to the Illinois Department of Conservation, will receive a "Step Into The Wild" button for their own keeping. To speed mailing, teachers are asked to gather requests for the buttons and send them in together.

LET US HEAR FROM YOU.

This is the first conservation education kit of its kind to be available to Illinois teachers. In order to prepare future kits and similar materials, we need to know how you found this packet as a teaching resource. Please write to this address with your comments and suggestions. They will be greatly appreciated.

Communications Program
Division of Forest Resources and Natural Heritage
Illinois Department of Conservation
605 Stratton Office Building
Springfield, Illinois 62706



This Illinois Natural Heritage Conservation Education Packet is jointly sponsored by the Illinois Department of Conservation and the Illinois Board of Education and is endorsed by the Illinois Advisory Board of Conservation Education. Materials in the packet were prepared by Sally F. Stone, Communications Coordinator, Division of Forest Resources and Natural Heritage, Illinois Department of Conservation. Illustrations were provided by Robert F. Eschenfeldt, Squires Ad Agency and Art Studio. The drawing of a red-shouldered hawk on page 29 was done by Bob Bridges of Springfield, Illinois. Kits can be obtained by writing:

Natural Heritage Conservation Education Kit
Illinois State Board of Education
100 North 1st Street
Springfield, Illinios 62777

ENDANGERED AND THREATENED SPECIES WORD SCRAMBLE

The names of 18 endangered and threatened species are included in the puzzle below. Names are written up, down, diagonally, forward and backward. If you find and circle all of the names and mail your completed exercise to the Illinois Department of Conservation, we will send you your own "STEP INTO THE WILD" button shown below.

B A R E V O L P G N I P I P T P E
D L N E K C I H C E I R I A R P K
O L U N T I N D I A N A B A T C I
O I U E A L L E B R E V L I S O R
W G B O B A L D E A G L E L S O H
S A Q J Y R J E F U D R R W T P S
S T Z N A Y E L L O W W O O D E D
A O S M R P Z A A A B Q C N T R A
B R F K G H O Q S R E N F R S S E
E G B S Y U T S L T H U G A M H H
T A M A R A C K I O D J I B Y A R
I R I F C O Y I D J E A D U Q W E
H E C B W V B C E A S H R S D K G
W U O F D Q W K R F J Z U T I V G
Z B I G E Y E C H U B K J Z E D O
Z W O G O L D E N M O U S E B R L

(cut-out)

BACKGROUND INFORMATION FOR TEACHERS

Each exercise in this instructional guide is ready to be copied and given to students. The following includes instructions and support information teachers may find helpful when working with the exercises.

ENDANGERED AND THREATENED SPECIES WORD SCRAMBLE

This exercise gives students an initial opportunity to look at the names of some of Illinois' endangered and threatened species. Each of the species included in the scramble are depicted on the poster included in "These Precious Few". Teachers should mail completed exercises in bulk to the address shown on the cover of this guide.

JOURNAL OF SARA

This feature can be used to introduce the concept of "natural heritage" to the students. The natural heritage of Illinois can be defined as the living landscape that greeted the pioneers who settled the state. It includes the plants and animals native to the state and also the land and water systems wherein they developed and survived. The natural heritage of Illinois also embraces the interactions that are carried out by organisms including man, within various natural ecosystems. Through Sara's journal, students can learn a great deal about the way the settlers felt about and interacted with the state's natural systems and its native inhabitants. By going back to what Sara relates about Illinois' natural history, her account can be used as a familiar and easily understandable reference while working with each of the exercises included in this instructional guide and with the text of "These Precious Few". A good follow-up activity to Sara's journal might be to have students write their own account of Illinois' natural heritage.

FOREST HABITAT SCENE AND FOREST HOTEL EXERCISE

The forest ecology section is designed to give students an understanding of how a forest habitat is made up of many different parts, each playing a critical part in making the forest a healthy ecological community. This section can be used to further clarify the principles that are underlined in the forest feature included in "These Precious Few". When working with this section, be sure to point out how detrimental the absence or removal of any part of the forest scene can be to the whole of the forest community. For instance, if all the dead or fallen timber were to be removed for firewood, many plants and animals would be left without homes and feeding stations. The habitat scene was prepared to represent an average Illinois forest and can be used in conjunction with any forest related activity or discussion. The Forest Hotel exercise or the principle of a habitat as a complex community consisting of many valuable parts can be adapted to many other habitat types, for example, a prairie, or a wetland.

PRAIRIE HABITAT SCENE AND POLLINATION AND SEED DISPERSAL EXERCISE

The prairie ecology section explores the processes whereby plants reproduce and the ways in which animals play a part in and benefit from those processes. The prairie habitat scene represents a true and undisturbed prairie, and should not be used to portray any other type of grassland habitat such as a meadow or old field, though some of the animal species are found in these other open field habitats. Many of the blooming plants shown in the scene do not actually flower at the same time but are shown doing so for purposes of the exercise. The prairie ecology section is an excellent compliment to the prairie feature included in "These Precious Few". Ask students to explain why a plants ability to successfully undergo the process of pollination affects its well being. Ask them to identify actual and potential problem plants written about in "These Precious Few" have or could have with the process of pollination.

WETLAND/WATER HABITAT SCENE AND FOOD PYRAMID EXERCISE

The wetland/water ecology section examines the exchange of food energy amongst plants and animals sharing an ecosystem. Bald Eagle, bobcat and red-shouldered hawk are the highest level predators. Mink, river otter, little blue heron and yellow-headed blackbird are the second highest consumers. Dragonfly, spring peeper, largemouth bass, northern water snake, mudpuppy, pond crayfish and map turtle are the third highest consumers and leaf beetle, muskrat, fat mucket, mayfly nymph, orb snail, zooplankton and water boatman are the fourth highest consumers.

This exercise can easily be adapted to any type of ecological community. Students may construct food pyramids from the forest and prairie habitat scenes included in this guide or they can choose a particular habitat and a cast of plant and animal species and construct their own pyramids. The wetland/water habitat feature included in "These Precious Few" outlines the various types of water-based habitats, namely wet meadows, swamps, marshes, ponds, streams and rivers.

ENVIRONMENTAL DECISION MAKING

This exercise gives each student an opportunity to assess an area of environmental concern, to examine options for its use, and to make a recommen-

dation based upon his/her own findings and judgement. To complete this exercise, students can work from an actual natural area which includes a forest, a grassland and a wetland or they can use the habitat ecology information provided in "These Precious Few" or in this instructional guide. If they work from a natural area, they may be able to conduct a transect study (see Environmental Investigations) to obtain the needed information.

ENVIRONMENTAL INVESTIGATION - A TRANSECT STUDY

A transect study can be conducted at almost any place. This type of study is a way of learning about an area without having to explore every square inch of it. This exercise familiarizes students with a standard and widely accepted form of environmental investigation. It is up to individual teachers to explain the different reasons why a transect study would be necessary. Teachers may wish to develop a mock situation. For instance, the students can pretend that they are developing an environmental impact statement for an area wherein plans to construct a major bridge are pending.

FALCON GAME

A good follow-up activity to this exercise is to have students pick another species and construct a similar game involving it.

BIRD APPRECIATION WEEK EXERCISE AND BIRD COLORING PAGE

The beaks and feet depicted in the Bird Appreciation Week Exercise are meant to represent broad categories of birds and students should be encouraged to point out additional beak and feet types belonging to the categories shown. Each of the birds included on the Bird Coloring Page are unnamed. Students should look at the centerfold poster in "These Precious Few" for their names and colorations.

EARTH DAY

Dedicated to protecting our environment, the first Earth Day was launched in 1970. While working with the Earth Day exercise, be sure to point out that though many of the earth's resources are recyclable, they are not without limits. For example, during 1980, Americans used 235.5 billion gallons of fresh water every day. Nearly half of this amount, or 105.2 billion gallons was not replaced by snow or rainfall. To make up the difference, wells are now tapping underground reservoirs, some of which contain fossil water 25,000 years old; this is gradually depleting immense subterranean reserves like the Ogallala aquifer, which stretches nearly 160,000 square miles beneath the Great Plains.

Ask the students to list all of the non-renewable resources of the earth and ask them to explain why conservation is so important with these and all resources. Earth Day is a good time to have students start aluminum, glass and paper recycling projects. Point out that they, like the earth, can help recycle precious resources. Facts such as the following, will help them see the magnitude of even small efforts. A three-foot-tall stack of newspapers, folded to half-page size as they are when we buy them, weighs about 120 pounds and represents the wood pulp of one tree. A ton of newsprint uses 17 trees and, if the trees are pulped under the sulphite process, 275 pounds of sulphur, 350 pounds of limestone, 60,000 gallons of water, 9,000 pounds of steam and 225 kilowatt hours of electricity.

ARBOR AND BIRD DAY

In 1949 the Governor of Illinois proclaimed the last Friday in April as "Arbor and Bird Day". Since then, Illinoisans have observed this day by planting trees, and shrubs and by conducting activities in schools and elsewhere to commemorate trees and birds and the necessity of their protection. Though the Arbor and Bird Day exercise centers around a dead tree, it can teach students how important trees are to natural communities.

The Illinois Department of Conservation sells pine seedlings at cost to state chartered organizations, such as Lions clubs, 4-H clubs, Jaycees and other public service groups which will distribute the seedlings to elementary schools for educational Arbor Day activities. Orders for trees should be placed by March 15 in order to insure delivery by Arbor Day. Orders must be for a minimum of 250 trees and should be accompanied by a letter explaining the sponsoring agency's program. Order blanks and price lists are available from DOC Regional Offices, county agriculture and extension advisors, the Soil Conservation Service or Agriculture Stabilization and Conservation Service. Information also may be obtained by contacting the Department of Conservation, Division of Forest Resources and Natural Heritage, at the address shown on the cover of this guide.

CLEAN STREAMS MONTH

The material included in the Clean Streams Month exercise was in part provided by the Illinois Environmental Protection Agency. If your class is planning a project for Clean Streams Month, The Illinois Environmental Protection Agency can provide information and assistance; Write:

William Hammel
Public Participation
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706
(217) 782-2752

Journal of Sara

December 29, 1840

Dear Journal:

Today our family celebrated a special anniversary. It has been two years now since we traveled up the Father of Waters and put ashore at Kaskaskia Landing, Illinois. I will never forget the last leg of our journey from Pennsylvania.

It was a bright clear Sunday morning when I awoke in a room at an inn in Bird's Point, Missouri. From my bed I could look out two windows on opposite sides of the room and see two mighty rivers, the Ohio, which we had just traveled down and the Mississippi, on which we hoped to embark. The Ohio, glistening in the sun, was flowing free, save the masses of driftwood that studded its waters. The Father of Waters was covered with an almost entire mass of ice, its waters making mysterious gurgling noises but pushing along slowly. The shores of both rivers were lined with dark, dense forest. From far and near, the woods crackled with the sounds of firing guns, the hunters out early to kill deer, it being Sunday was of no avail to these men of the Western wilderness.

Two boats came in tandem down the Mississippi from St. Louis that day. The lead boat, because of the treacherous ice, had not a board left on her paddle wheel. Nonetheless, the captain of our boat was determined to proceed upstream toward St. Louis.

Assisted by his crew, the captain worked into the night fixing trees to the bows of the boat to ward off the ice. Early the next morning we shoved off. Except for the two times we ran aground trying to avoid the ice, the boat made way, though slowly, and I fell to watching the features of the river.

There is something lonesome, though beautiful, about the Father of Waters. Its wide waters are dark and boiling. Its jagged mud banks are constantly tumbling into the water along with young trees. Much of the country is low and swampy. Large piles of driftwood are jammed up against the numerous islands clad in cottonwoods. At some places where the shore does gain a bit, usually at a bend in the river, bald-headed eagles and turkey buzzards collect to pick apart beached carcasses. There is a total want of civilization on the river, except for an occasional poor log hut. Sounds along the river are few, save its own sounds of passage and the chirping and cooing of birds. And from every angle, the river is bounded from above by the heavy trunks and limbs of the ancient forest, seeming to guard its peaceful isolation.

As the boat traveled northward, the river grew narrower, with great limestone bluffs rising beside it up to two and three hundred feet. After we passed both Grand Tower and Chester, the latter being the point where the Mississippi is said to be the narrowest, about 840 feet, we finally arrived at Kaskaskia Landing. The boat was headed into the bank, a plank ran out, our luggage tumbled ashore, the order was given to go on, and there our little family stood, quite alone as the sun was sinking over the woods of Missouri and darkness coming on apace. After scrambling up the muddy bank of the river, our bodies plastered with mud, we saw a small roofless hut on the edge of the woods. Two young men were standing beside the hut and when my father asked them if they could arrange to have our luggage carried to Kaskaskia, they brought around two horses and a small wagon. Under a clear frosty night sky, we set off down a rough track through the woods. It was not long before we reached a large clearing, whereupon we saw the lights of Kaskaskia in the distance.

The next morning I had a chance to see one of the oldest settlements in the West. Kaskaskia was settled by the French in 1685 and was the capital of the district as long as the French continued in possession of the country. The town is built on an isthmus of about three miles wide, formed by the Mississippi and Kaskaskia rivers and is situated on the right bank of the latter. The peninsula between the town and the junction of the rivers constitutes the lower extremity of the famous American Bottom. Said to cover an area of 450 miles, the Bottom is a wild and rich land, in some places densely wooded and intersected with ponds and back-waters, and in others, consisting of prairie, interrupted by groves of pin oak, hickory, persimmon and paw paw.

Eager to push on from Kaskaskia toward our destination, we hired a wagon and crossed Kaskaskia River by ferry. After a long hard pull up the bluff, which must have been about 300 feet high, we looked eastward over the Illinois country. Clothed as far as we could see in forest, the land fell back from the bluffs and eventually leveled off. After we had traveled a crude road through the forest for about ten miles, we came upon several grassy openings, a sure sign that the forest would soon give way to the true king of the Illinois country, prairie.

Plum Prairie is where our family settled to take up farming. Though life in the West is full of "makin do", I have come to love this state shaped like an arrowhead and I am learning more each day about its natural features. Prairies are a wonder that no one from the East can fully imagine. In late summer, the grasses reach upward some three to four feet, tall enough to easily conceal an army of men on horseback. The prairie is free of trees but rich with grasses and flowers of every scent and hue. Most of the surface of the prairie is gently rolling while other parts lay low and are wet or "splashy" as the natives call it. Prairies vary in size from a few acres to 12 miles across. A traveler entering upon a prairie may see a dark line of trees or a distant cabin in one direction but in all other directions, the traveler's vision is unbounded by anything except an occasional meadowlark or plover. The arc of sky above the prairie is always 180 degrees.

With every fall, the prairies burn. When the Indians lived here, they set the prairies afire in order to chase up herds of buffalo. The Indians are gone now except for isolated villages, but when lightening hits the thick crop of grasses in dry clear autumn, prairies ignite with fury. No sight is more spectacular. Flames, leaping and roaring over the grasses; the prairie becomes an ocean ablaze. The sky lights up like a sheet of hot red metal and the country is lit for miles. During many of our fall days here in the West, the atmosphere becomes dry and smokey and the sun is shorn of its rays. This is called Indian summer and many believe that the burning of thousands of acres of prairie causes this peculiarity.

Believe it or not, it is fire that gives life to prairies. Illinois is a country where forest and prairie compete for a share of the land and the annual fires prevent the growth of trees on the prairies. The fires also burn off the matted layers of dead grasses so that the tiny stems of flowers can push up through the ground surface the following spring. Though the fires shear the prairies of all their vegetation, the roots of its grasses and flowers lay safely underground ready to come up at a later time.

Unfortunately, fire is no friend to the prairie family who needs to protect their home, barn and fences. There is a law now forbidding anyone to "set out fire" on the prairie. If fire does break out and come toward a home, the people set afire the grasses near the house and fan the flames away. That way the fire continues to burn but is swept in the opposite direction from the house. But most of the time now, the settlers are able to control wild fires on the prairies near their settlements and in these areas, trees are starting to grow up.

Settlers in this part of Illinois use the prairie for two main purposes, grazing cattle and growing Indian corn, wheat and oats. Prairie does not bear much eating and will soon become "eat out" or bare of its grasses if a large number of cattle are kept on it. Prairie is plowed in spring. When the prairie is broken for the first time, a special prairie plough is used on the stubborn land. The rind is so tough that the plough is often out of the ground as much as it is in. Fortunately for those doing the plowing the slightest displacement of the soil destroys the prairie grasses and though the work is tedious, the prairie needs only to be broken once.

The buffalo or bison has disappeared from the prairies of Illinois. The home of this noble animal is wilderness and as this land has become settled, the buffalo has moved westward. At the turn of this last century, there were still plenty of buffalo in Illinois. The narrow paths they pounded in the earth between the inland prairies and the major rivers are still carved in the land. The elk, as well, has vanished from the Illinois country.

Wolves are most commonly seen on the prairie. Packs of wolves can be heard through the night, howling and yelping. When these animals turn from their natural prey to a farmer's sheep, cattle or young hogs, they are held in evil odour. Though widely feared, they seldom attack people, and then only when pressed by hunger and in large packs. The wolf is said to be a coward at heart and when trapped, will allow itself to be beaten to death. The government offers a bounty of four dollars a scalp for wolves.

Prairie chickens can be seen in flocks of hundreds on some prairies. Their "bum-booing" can be heard for a mile on a calm morning. Prairie chickens are very good eating. During cold weather, they are easily caught in great numbers with traps. Sometimes a hunter will shoot one, but it is generally thought to be a waste of powder and lead.

Bears and cougars are soon killed out in prairie districts so they are more often found in the refuge of the dense forest. Beavers, once thought to be in great plenty are now nearly extinct from the state. The raccoon abounds and is very destructive to Indian corn, which it attacks as soon as milk is in the ear. The skunk is frequently seen on the prairies and in the woods. He leaves his hole about dusk and wanders about in search of prey throughout the night. Woe to anyone who comes near this creature because if his or her clothes are sprinkled with the fluid of the skunk.

"The wide sea hath drops too few to wash them clean again."

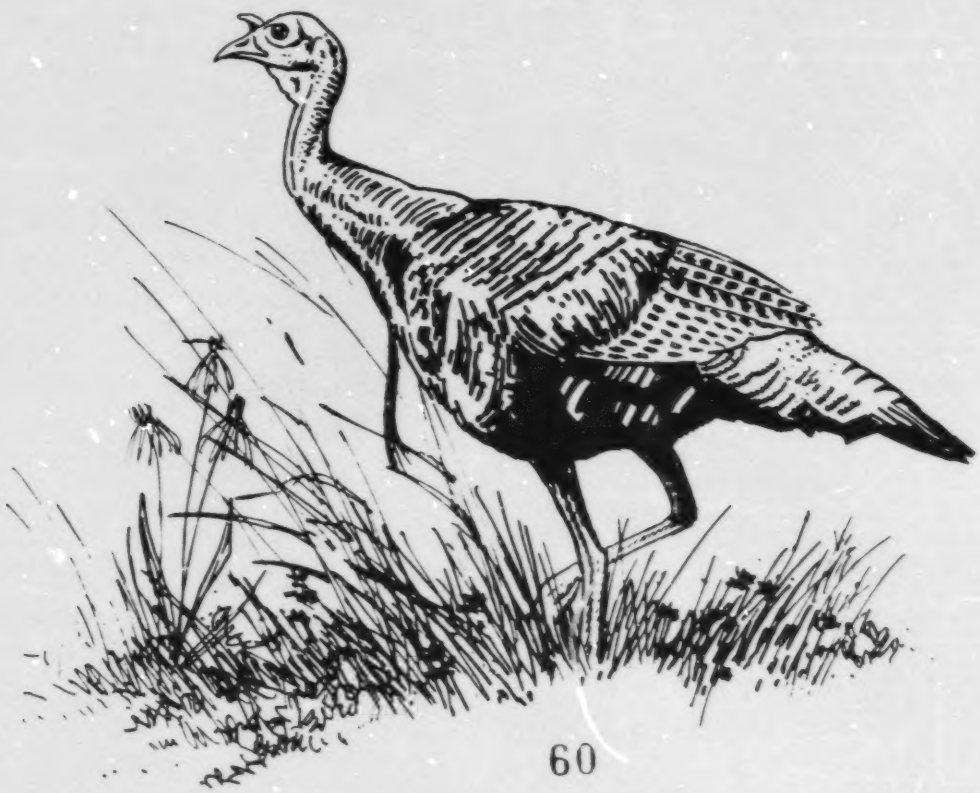
The American hare or rabbit is becoming more populous as the country is settled. This animal does not burrow and is frequently found in the hole of a ground hog or badger or sometimes in a hollow tree. The quail or partridge also seems to accompany people and its numbers increase with settlement. These birds are caught by the scores in nets of conical shape. Two riders on horseback corral the birds and place a net over coveys of ten to twenty birds.

The barred owl is held in contempt because of its night-time raids on chickens. Chickens are allowed to nest in the tops of trees surrounding the house and it is said that if an owl succeeds in carrying off one chicken one night, it will return until nary a fowl is left. Many a time, the farmer watches on a moonlit night and shoots the owl on the approach. I do believe, however, that only a few birds of this species turn henrobber for if all barred owls were, it would be quite impossible to keep fowl without shutting them up every night in a hen house.

The noble wild turkey is plentiful in many parts of the state. The wild turkey is the wariest of game and to hunt this bird, one must have a power of limb very fast. I know of one instance of a turkey being chased by a man on horseback for over three miles.

Fishing with a seine is often practiced in ponds and lagoons that receive a new supply of fish from the rivers. Shooting fish with a rifle from a bank or an overhanging tree is a pastime often resorted to by sportsmen. A fish is fired upon when it rises to the surface of the muddy water to bask in the sun. A fish is sometimes killed without being touched by a bullet, the concussion of the water, it would seem, is enough to do the job.

During seasons of migrations, lakes and ponds are nearly covered with multitudes of swans, cranes, geese, and ducks. These wild fowl stir up great havoc carrying out their feeding and mating routines.



Most of our neighbors do their own hunting but there are some whose sole occupation is hunting. The real hunter is the pioneer of American civilization. He is the first to challenge the ownership of the wilderness with the red man and with the wild creatures. And like them, the hunter is intolerant of the approach of a settlement. The sound of the axe in the woods is hateful to the hunter; and no sooner does the smoke of a settler's fire enter his neighborhood, then, packing up his scanty belongings, and placing them in a primitive wagon, he and his family seek a more acceptable home in those solitudes where nature still holds undisputed sway.

They say that once a person acquires a habit of wandering the pathless wilderness in search of game, it takes such a hold that he rarely shakes it off. The old hunter's eye is never at rest. While he is talking to you, his eyes are wandering from object to object, and if he is standing, he is constantly shifting his position, and with his head and shoulders crouched from habitual caution, his eyes repeatedly survey the entire circle of vision.

The white man is the second hunter to work this land. The red man was the first. Lacking horses, Indians chased their game on foot. Like the great birds of prey, the Indians were skilled hunters whose talons were arrows, whose speed was in their cunning, whose strength was the prairie fires they lighted to outrun the herds of buffalo. Though the Indians knew famine in its seasons, they took what they needed from the rich land. Yet, even in the midst of abundance, they were not wasteful. The animals too, they thought, had souls; they must not be insulted or their spirits broken. When a beaver was eaten, the bones were not thrown to the dogs, lest other beavers should be insulted. Before the Indians set out to kill buffaloes, they sat down for a while and cried tears for them. And the herbs were the belongings of the earth and when they borrowed a small harvest, they asked her pardon.

"I take these thy hairs,
Nokomis, grandmother,
and I thank you and ask your pardon."

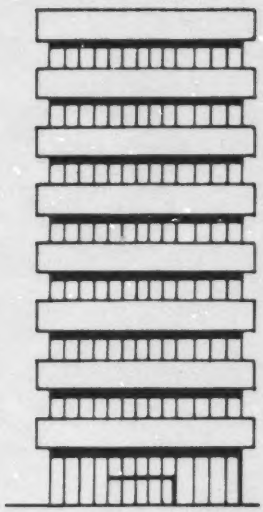
Alas, dear journal, it is now time for me to close for this wintry day. Darkness is coming on fast, though I can still hear the sounds of the men out working the chopping bee. Mother says that 25 men are competing in the chopping bee today. Since dawn, the forest has been exploding with the sounds of axe blows and ever and anon, a tall monarch of the woods has thundered to the earth. Somehow, it all seems very fitting on this special day of commemorating our family's move to Illinois.

THINKING FURTHER:

1. In the above account from her journal, Sara writes about the natural heritage of Illinois. How do we define the term natural heritage?
2. Sara refers repeatedly to the Father of Waters. What is she referring to? How do you think the use of this name came about?
3. Sara writes that her family started up the Mississippi River from Bird's Point, Kentucky, a place where the Mississippi and Ohio Rivers meet. What is the course of the Ohio River, the course of the Mississippi River?
4. Knowing that most travelers from the East used the major rivers to travel westward, can you guess at the route Sara's family must have taken from Pennsylvania?
5. Sara writes of the American Bottom in her account. What are the boundaries of the American Bottom? Does it still exist?
6. On the way from Kaskaskia to Plum Prairie, Sara writes that they traveled through dense forest until the forest gradually began to give way to prairie. What is the name of the transitional habitat that is found between a forest and prairie? Usually, there is a good bed of grass and scattered trees in this type of habitat.
7. Sara writes that life in the West is full of "makin do". Why does she refer to Illinois as the West instead of the Midwest?
8. Sara writes that fire is the prairie's friend. How can this be? Sara also writes that in areas where fires are controlled, trees are starting to overtake prairies. How can you explain this?
9. What uses did the settlers make of the prairies? Sara writes that the prairies need only to be broken once. What does she mean?
10. Sara writes that wolves came into conflict with farmers and that they were greatly feared. Knowing this, can you give some of the reasons why wolves no longer live in Illinois?
11. Sara writes that prairie chickens were easily caught in large numbers. In what ways did their habitat help make them easy to catch?
12. Sara writes that bears and cougars were soon killed out in prairie districts and that they sought the refuge of the dense forest. What protection did the forest offer the bear and cougar? Bears and cougars are now extirpated from Illinois. What does extirpated mean? What does this tell you about what has happened to Illinois forests since 1840.
13. Sara writes that populations of rabbits and quails seemed to increase as areas were settled. Can you explain why some animals can live more easily near people than others? Do you know of some animals that seem to be able to live near cities and towns? Do you know of some animals that can only live in wilderness?
14. Sara explains how different animals hunt to obtain their food. She also writes about the human animal as a hunter. Explain the role of people as predators in the natural history of Illinois.
15. Sara writes that the real hunter was the pioneer of American civilization. What does she mean?

FOREST IS A HOME ADDRESS FOR:

1. Cooper's hawk
2. southern flying squirrel
3. Kentucky warbler
4. screech owl
5. eastern gray squirrel
6. white oak
7. gray fox
8. shelf fungus
9. black carpenter ant gallery
10. fall webworm caterpillar
11. white-tailed deer
12. spotted salamander
13. eastern box turtle
14. red-bellied snake
15. eastern mole
16. green june beetle
17. Virginia bluebells
18. blue-eyed mary
19. walkingstick
20. redbud shrub
21. wood nymph
22. golden mouse
23. mockingbird
24. American robin
25. flowering dogwood



THE FOREST HOTEL

Study closely the forest scene drawn on the opposite page. Try to think of some ways in which a forest is similar to a hotel and using the drawing as a reference, answer the following questions.

1. A hotel has many floors. What are the different floors or layers of a forest? A hotel has many guests who stay on the different floors. Who are the residents of the forest and on which floors do they stay?
2. The basement of a hotel is usually dark and moist. Likewise the _____ beneath the forest is moist and dark. A hotel has stout beams in its basement to support the building. A forest basement has strong _____ to support trees and shrubs.
3. Circle each of the following that live at least some of the time in the basement of the forest. raccoon, cardinal, ants, eastern mole, snails, common box turtle, green june beetle, crickets, centipedes.
4. Fallen leaves, small plants and rotting logs furnish the first floor or lobby of a forest. In a hotel, the lobby is where visitors from many of the floors meet and move about. The lobby of a forest is also a busy place. Which of the following move through the lobby of a forest just as people move through the lobby of a hotel. bobcat, bald eagle, southern flying squirrel, gray fox, spotted salamander, raccoon, white-tailed deer, people, eastern mole.
5. In a hotel, people move up and down by way of an elevator. In a forest, animals move up and down by way of tree _____. Which of the following use these "Tree Elevators". eastern fox squirrel, american robin, opossum, eastern box turtle, white-tailed deer, white-breasted nuthatch, gray fox, brown creeper, and walkingstick.
6. The first few floors of a hotel are similar to the shrub layer of a forest. Both are above the ground level but are low in comparison to the higher floors of the hotel or the taller reaches of a forest. Because the shrub layer of a forest is thick with branches, vines, and leaves, this is where the nests of which of the following are found. barn owl, American robin, bullfrog, Kentucky warbler, cardinal, gray fox, mockingbird, red-bellied snake, and golden mouse.
7. The mid-level floors of a hotel are similar to the mid-level of a forest formed by the small trees or understory trees. Branches in these trees are often good _____ perches for songbirds. In the forest scene drawn on the opposite page, all of the following are songbirds except: American robin, Kentucky warbler, mockingbird, Cooper's hawk.
8. The highest floors of a hotel usually contain the apartments and penthouses of permanent residents. Likewise the highest branches of the tallest trees in a forest contain the homes or nests of many animals. Which of the following place their nests in the tallest branches of the forest. Kentucky warbler, Cooper's hawk, eastern gray squirrel, great blue heron, cardinal, golden mouse.
9. In spring and summer, the highest branches are covered with _____. Like a roof over a hotel, these _____ and branches form a canopy over the forest protecting its residents from _____ and _____.

PRAIRIE/OPEN FIELD HABITATS ARE A HOME ADDRESS FOR:

1. American kestrel
2. upland sandpiper
3. cucumber beetle
4. blue racer
5. prairie vole
6. side-oats grama
7. little bluestem
8. flesh fly
9. robber fly
10. hoary puccoon
11. honey bee
12. wild hyacinth
13. badger
14. young thirteen-lined ground squirrels
15. thirteen-lined ground squirrel
16. aphids
17. pale prairie coneflower
18. eastern meadowlark
19. nodding wild rye
20. praying mantis
21. greater prairie chicken
22. wild false indigo
23. hornworm caterpillar
24. purple prairie clover
25. bumble bee
26. sawtooth sunflower
27. bobolink
28. Indian grass
29. compass plant
30. eastern meadow fritillary butterfly
31. plains pocket gopher
32. needle grass

POLLINATION AND SEED DISPERSAL

The prairie habitat drawn on the opposite page provides a good scenario for examining the processes of pollination and seed dispersal. From April to late September about 17 new species come into flower each week on a prairie. They bloom for a short while, move into seed production and finally into their final duty, seed dispersal.

WIND AND INSECT POLLINATION

To produce fertile seeds a plant usually needs pollen from the stamen to be brought into contact with the stigma so that the ovary can be fertilized. The stigma is part of the female organs of a plant and the stamen part of the male organs. The two most common methods of pulling off this exchange of pollen is by insect and by wind.

In order to attract insects to their blossoms, insect-pollinated plants have very beautiful flowers. Many emit a sweet aroma of nectar and some even feature dark lines (pollen guides) on their petals to lead the insects to the hidden nectar on which they feed. While an insect feeds on nectar or pollen, pollen brushes off the stamen onto the insect. Then when the insect settles on the stigma of the same flower or on the stigma of another flower of the same species, the pollen is rubbed off the insect onto the stigma. The pollen then travels down the tube of the stigma and fertilizes the ovary where the eggs are stored and these eventually become seeds.

Bee pollinating
the flower of wild hyacinth

Wind-pollinated plants have rather uninteresting flowers and large stamens which dangle on long stalks. The wind can easily shake these stamens and knock the pollen into the air. The stigma are also large and have features somewhat like feathers, so that their feathery edges can trap pollen in the wind. Petals on wind-pollinated flowers are either very small or not there at all. This keeps the areas around the stamen and stigma free, allowing the stamen and stigma every chance to put out and receive pollen.

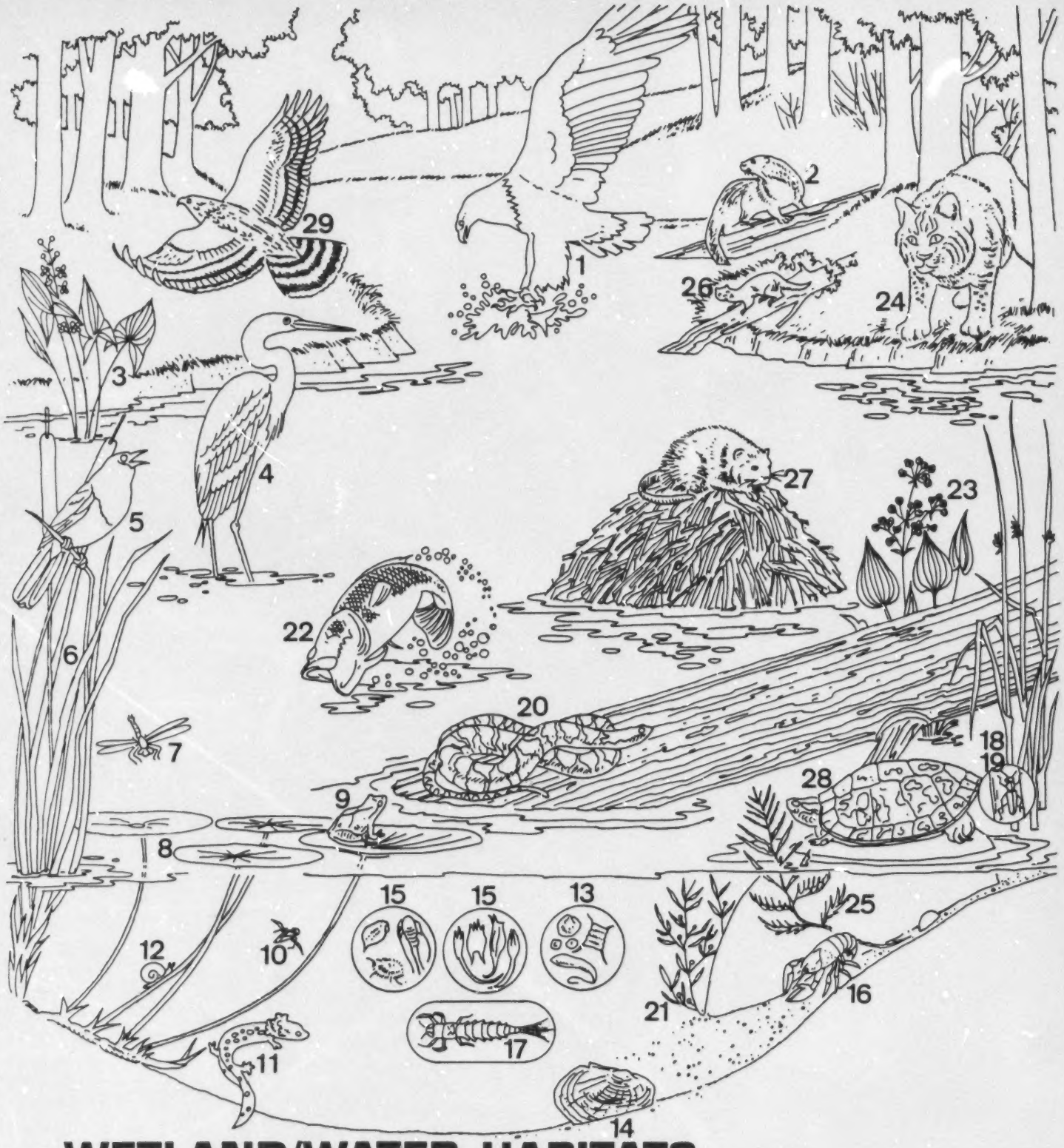
SEED DISPERSAL

As plants mature, the ovary usually gives way to some type of fruit, which cradles the seeds. To disperse these seeds, plants depend on many different methods. Sometimes a fruit ripens and bursts, freeing the seeds to fall or blow with the wind. Other times, a fruit drops to the ground and the pulp rots and the seeds enter the soil; or the fruit is eaten by a bird and the seeds are spread when the bird either spits out the seeds or passes them out in its droppings, sometimes many miles away; or the seeds are carried by a squirrel, or pushed around by insects, or blown by the wind or carried down streams or rivers. Many plants have wings on their seeds so they can be carried about by the wind. Some have hooks on their seeds which catch in the fur or feathers of visiting animals. Thus, though plants stay still, their seeds are short and long range travelers.

THINKING FURTHER

1. Name each of the plants shown on the opposite page that are pollinated by insects; which are wind-pollinated?
2. Name each insect pollinator included in the drawing. What are some other insect pollinators that are not shown?
3. Of the plants shown in the drawing, how do you think each disperses its seeds? Name the animals that play a part in seed dispersal.

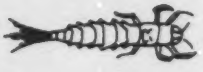
Needlegrass is named for its sharp-pointed seed ("the needle") and its long twisted awn ("the thread"). The awn is sensitive to moisture changes and as the moisture of the soil changes, the awn actually drills the seed into the ground.



WETLAND/WATER HABITATS ARE A HOME ADDRESS FOR:

1. bald eagle
2. river otter
3. common arrowhead
4. little blue heron
5. yellow-headed blackbird
6. common cattail
7. dragonfly
8. American lotus
9. spring peeper
10. water boatman
11. mudpuppy
12. orb snail
13. phytoplankton
14. fat mucket
15. zooplankton
16. pond crayfish
17. mayfly nymph
18. American bulrush
19. leaf beetle
20. northern water snake
21. leafy pondweed
22. largemouth bass
23. beaked burhead
24. bobcat
25. marsh mermaid weed
26. mink
27. muskrat
28. map turtle
29. red-shouldered hawk

A FOOD PYRAMID



A wetland or water habitat is a good place to examine how plants and animals exchange food energy. Each of the plants and animals drawn on the opposite page have a place in the food pyramid shown above. None of the species are labeled. Look closely at the unlabeled drawings, match them with those shown on the opposite page and mark down the names. Some of the animals are not even shown. Find the missing animals on the opposite page and place them in the pyramid by drawing and labeling them in the correct level. Before you begin, carefully consider this information.

Deriving energy from the sun, plants, including microscopic plants or phytoplankton, are the primary food producers. Plants form the base of the food pyramid. At the top of the pyramid are the highest-order predators. Between the base and the top, are the intermediate consumers. Each of these preys upon one or more of the animals or plants shown below it and each is preyed upon by one or more of the animals shown above it. Some of the animals prey upon other organisms stationed in their own level. For example, the mayfly nymph preys upon zooplankton, which consists of many tiny crusteceans and rotifers. After you have completed your food pyramid, you may wish to draw lines from each animal to the plants or animals it consumes. Use a different color of crayon or pen for each animal.

THINKING FURTHER

1. Define the terms herbivore, carnivore and omnivore.
2. Why is an animal as big as the muskrat located at the same level as the tiny orb snail?
3. Why are there so few species at the top of the pyramid?
4. What happens to a plant or animal if it dies and is not eaten? How does this process work in the exchange of food energy?

ENVIRONMENTAL DECISION MAKING

You are a member of the City Council of Anyville, Illinois, a growing industrial city bordered on all sides by rich farmland. Miss Matilda Jones, a native of Anyville has just passed away and left the city 60 acres of land. At present, the land is open only to hunting, hiking, nature study and fishing and is closed to all vehicles. Several different groups in Anyville have submitted proposals to the City Council for future use of the land. As Chairman of the Land Use Planning Committee, it is your job to conduct a study of the sixty acres and to review all the proposed options for its use. At the next City Council meeting, you will make a recommendation for use of the Jones property and you must be prepared to justify your decision. Though Miss Jones did not specify how she wanted the land used, she did state in her will that the land should be used in the most valuable manner possible. To conduct your study of the Jones property use this worksheet. Some items have already been completed for you.

STEP ONE— DIAGRAM THE PROPERTY

STEP TWO—INVENTORY THE AREAS

I. Forest Area

(A) What is the make-up of the forest area?

Mature Hardwoods. (Elm, Oak, Hickory species)

(B) What forms of life live in the forest area?

Plants	Mammals	Birds
1.	1.	1.
2.	2.	2.

Amphibians/Reptiles	Insects
1.	1.
2.	2.

(C) How valuable is the forest area?

1. to plants/animals?

highly valuable fairly valuable not very valuable

2. to people?

highly valuable fairly valuable not very valuable

II. Grassland Area

(A) What is the make-up of the grassland area?

Abandoned farm field grown up in grasses, weeds and shrubs. This area was once prairie.

(B) What forms of life live in the grassland area?

Plants	Mammals	Birds
1.	1.	1.
2.	2.	2.

Amphibians/Reptiles	Insects
1.	1.
2.	2.

(C) How valuable is the grassland area?

1. to plants/animals?

highly valuable fairly valuable not very valuable

2. to people?

highly valuable fairly valuable not very valuable

III. Marsh Areas

(A) What is the make-up of the marsh area?

Clean, fairly shallow water bounded by rich vegetation of cattails, rushes and lotus.

(B) What forms of life live in the marsh area?

Plants	Mammals	Birds
1.	1.	1.
2.	2.	2.

Amphibians/Reptiles/Fish	Insects
1.	1.
2.	2.

(C) How valuable is the marsh area?

1. to plants/animals?

highly valuable fairly valuable not very valuable

2. to people?

highly valuable fairly valuable not very valuable

IV. The Total Property

All factors considered, the combined areas of forest, grassland and marsh make the Jones property:

1. to plants/animals?

highly valuable fairly valuable not very valuable

2. to people?

highly valuable fairly valuable not very valuable

STEP THREE—LIST THE OPTIONS

The following are recommendations that have been submitted to the Anyville City Council for use of the Jones property.

1. Cropland
2. Nature Preserve
3. Wildlife Production/Public Hunting Area
4. Housing Suodivision
5. City Park

STEP FOUR—EVALUATE THE OPTIONS

I. Cropland

(A) How would the make-up of the land change?

_____

_____

(B) Would the number of plants/animals living on the land stay the same, increase or decrease?

1. If increase, why? _____
2. If decrease, why? _____

(C) From its present condition to a cropland, the Jones property would change or not change its value:

1. for plants/animals?
   from _____ valuable to _____ valuable.
2. for people?
   from _____ valuable to _____ valuable.

II. Nature Preserve

(Only photography, hiking and nature study permitted—no vehicles)

(A) How would the make-up of the land change?

_____

_____

(B) Would the number of plants/animals living on the land stay the same, increase or decrease?

1. If increase, why? _____
2. If decrease, why? _____

(C) From its present condition to a Nature Preserve, the Jones property would change or not change its value:

1. for plants/animals?
   from _____ valuable to _____ valuable.
2. for people?
   from _____ valuable to _____ valuable.

III. Wildlife Production/Public Hunting Area

(No vehicles, hunter presence during seasons)

(A) How would the make-up of the land change?

_____

_____

(B) Would the number of plants/animals living on the land stay the same, increase or decrease?

1. If increase, why? _____
2. If decrease, why? _____

(C) From its present condition to a Wildlife Production/Public Hunting Area, the Jones property would change or not change its value:

1. for plants/animals?
   from _____ valuable to _____ valuable.
2. for people?
   from _____ valuable to _____ valuable.

IV. Housing Subdivision

(A) How would the make-up of the land change?

_____

_____

(B) Would the number of plants/animals living on the land stay the same, increase or decrease?

1. If increase, why? _____
2. If decrease, why? _____

(C) From its present condition to a housing subdivision, the Jones property would change or not change its value:

1. for plants/animals?
   from _____ valuable to _____ valuable.
2. for people?
   from _____ valuable to _____ valuable.

V. City Park

(A) How would the make-up of the land change?

_____

_____

(B) Would the number of plants/animals living on the land stay the same, increase or decrease?

1. If increase, why? _____
2. If decrease, why? _____

(C) From its present condition to a city park, the Jones property would change or not change its value:

1. for plants/animals?
   from _____ valuable to _____ valuable.
2. for people?
   from _____ valuable to _____ valuable.

STEP FIVE—MAKING A DECISION

My recommendation is to use the Jones property as a _____

_____.

I feel that this is the use that is the most valuable to

_____

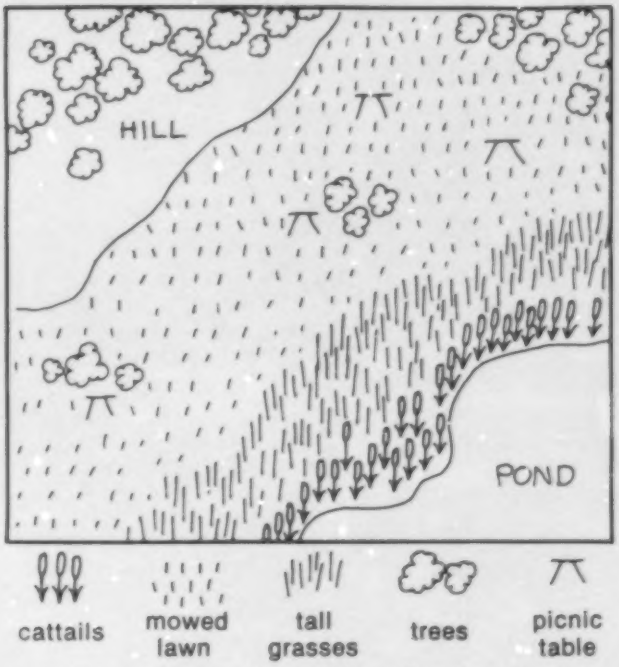
for these reasons.

1.
2.
3.
4.

ENVIRONMENTAL INVESTIGATIONS — A TRANSECT STUDY

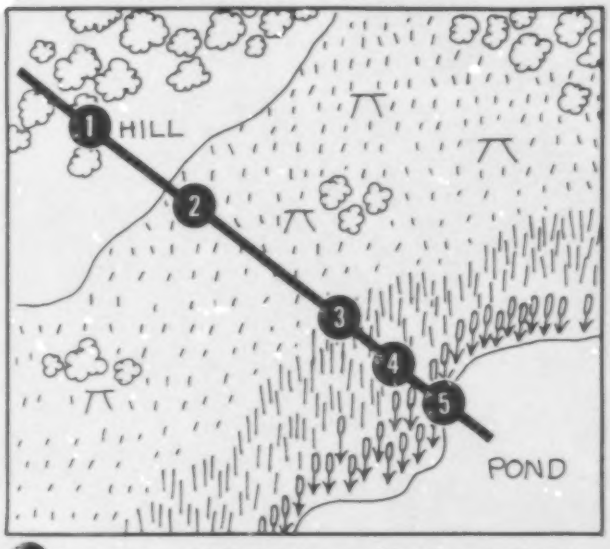
You have been assigned to conduct a biological inventory of a particular area. Your job is to determine the physical characteristics of the land and the forms of life residing there.

STEP I - MAPPING



1. Get to know the boundaries of the study area. Walk over the area - acquire a feel for land formations, natural and manmade structures.
2. Construct a working map of the area. In plotting items on the map, such as shrubs, trees and grasses, use consistent symbols.

STEP II - ESTABLISH A TRANSECT LINE



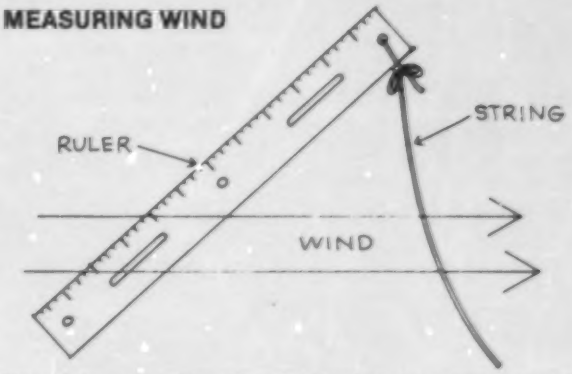
4 locations of information collecting stations

1. Place a transect line on your map. A transect line is an imaginary line through the study area. The start and end of the line can be marked with a large rock, stick or stake.
2. Mark on your map several information collecting stations along the transect line. Locate stations in areas along the transect line so that a representative cross section of the area will be studied.
3. Using your map, mark the actual placement of the information collecting stations in your study area.

STEP III - COLLECTING INFORMATION

At each station collect some information on the physical characteristics and inhabitants of the place.

MEASURING WIND

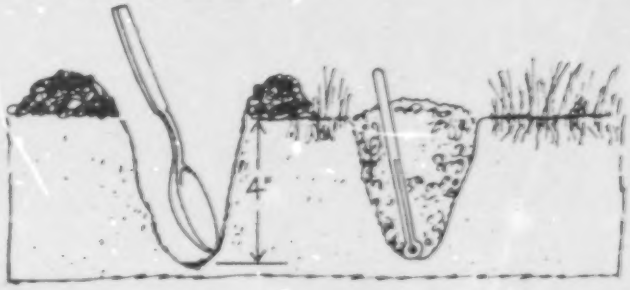


You can use this simple device to compare wind velocities from one place to another. The size of the angle between the string and the ruler will indicate the intensity of wind. At each station, measure wind velocities at ground level, waist level and above the head level.

TAKING TEMPERATURES

Allow your thermometer about 3 minutes to register a reliable reading. Take temperatures at varying levels.

- air temperature, shoulder height
- surface temperature, measure with thermometer flat on the ground.
- soil temperature, measure at about 4 inches below the surface.



DESCRIBING SOIL

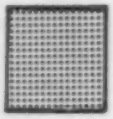
Use a spade to turn over a small portion of soil. An old spoon or knife will work in a pinch. Record the moisture, texture and color of the soil.

MOISTURE

- Dry: falls apart and sifts between the fingers
- Slightly moist: appears moist but does not stick together when squeezed
- Very moist: squeezes freely and water is obvious
- Wet: water drips

TEXTURE

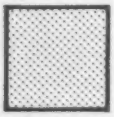
Soil is usually a mixture of varying sizes of particles. The abundance of particles of a certain size helps define a soil type. By examining your soil sample, can you determine if your soil is one of these basic types.



Sand - coarse soil

Silt - fine soil particles

Clay - extra fine soil particles



Laom - medium soil particles

COLOR

Also note soil color. Generally dark soils contain more decayed plant and animal remains than lighter soils.

MEASURING SUNLIGHT

Estimate the proportion of shade to sunlight at each station.

Very Sunny - most of the ground surface is covered by sunlight

Sunny - about ¾ of the ground surface is covered by sunlight

Moderately Sunny - equal amounts of sun and shade on the ground surface

Shady - about ¾ of the ground surface covered by shade

Very Shady - most of the ground surface is covered by shade

DESCRIBING THE INHABITANTS

PLANTS

Ground cover plants. Use a coat hanger wire to isolate a sample plot anywhere within several feet of the station marker. Within the sample plot.

- Wrap a piece of tape around each plant collected and put the number and name on the tape
- Put the plants in a plastic bag

SHRUBS AND TREES

- Remove a twig with leaves from each of the most common plant types within several feet of the station marker
- Count the numbers of each plant type and record whether they are trees or shrubs
- Put the number on a piece of tape and wrap it around the twig
- The twigs should be placed in a plastic bag

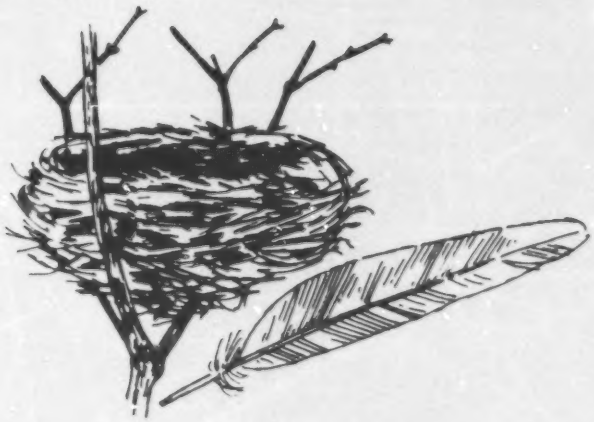
ANIMALS

The presence and activity of many forms of animal life can be inferred from many signs. Investigate slowly and critically by looking under things, among leaves and twigs and by digging under the litter on the ground surface.

Birds: Songbirds, geese, ducks, herons, hawks and more

songs
egg shells
foot prints
bones
nests
feathers
half-eaten seeds
droppings

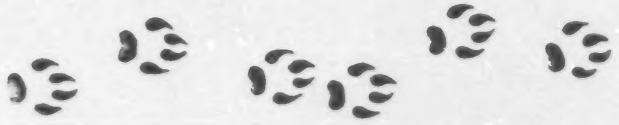
1.
2.
3.
4.
5.



Mammals: deer, rabbits, cats, dogs, mice, muskrats, humans and more

tracks
burrows
bones
fur
muskrat houses
holes
droppings
trails and mouse runs
nut shells

1.
2.
3.
4.
5.



Insects, bees, ants, grasshoppers, butterflies

gnats
ant hills
cocoon
caterpillars
chewed leaves

1.
2.
3.
4.
5.

REPTILES/AMPHIBIANS/FISH

burrows
tracks
skins
bones

1.
2.
3.
4.
5.

STEP IV - RECORDING THE INFORMATION

Fill out a data sheet similar to the one shown below for each information collecting station on your transect. The information you record may be used for many years by many people and its value will depend greatly on how clearly you record it.

DATA SHEET

TRANSECT STUDY

Location: _____

Date: _____

Station Number: _____

WIND	Ground Level	Waist Level	Above Head
	_____	_____	_____

TEMPERATURE	
	Air Temperature
	Surface Temperature
	Soil Temperature

SUNLIGHT: (Circle One)
Very Sunny
Sunny
Moderately Sunny
Shady
Very Shady

SOIL						
	MOISTURE: (Circle One)	Dry	Slightly Moist	Moist	Very Moist	Wet
	TYPE: (Circle One)	Sandy	Silt	Clay	Loam	Color

PLANTS: Describe or sketch your observations:

ANIMALS: Describe the animals or signs of animals you found in your areas on the back side of this sheet.

STEP V - LOOKING AT THE INFORMATION

We said at the beginning that your mission in conducting this transect study was to prepare a biological inventory of a particular area. Your completed data sheets represent that inventory and your mission is largely completed. But what do the results tell you about your area and its natural inhabitants. Look over your data sheets and answer the following questions.

1. Why is wind velocity generally stronger at above head level? How do animals use this to their advantage?
2. Does plant cover affect ground temperatures? Give an example to support your answer.
3. Do certain plants seem to grow only in certain soil types? Are there some plants that grow in more than one soil type? How can a soil type affect the animals present in an area?
4. Do some plants grow only in shady areas? Do some grow only in sunny areas? Do some grow in both? Is a plant likely to be more abundant if it grows only in shady areas, in sunny areas, in both?
5. Do some animals live only in wooded areas? Do some live only in grassland areas? Do some live only in wet areas? Are there any animals that travel from one type of area to another? For instance, are there animals that move between the forest and the grassland and even to the wetland. Is an animal likely to be more abundant if it lives only in the forest, only in the grassland, only in a wetland, or if it lives in a variety of habitat types?
5. Are some animals present near humans and human activities? Are some animals present only far away from humans and human activities? Is an animal likely to be more abundant if it can tolerate humans and human activities?

FALCON GAME

Three subspecies of peregrine falcons are found in North America - the Arctic peregrine in Alaska and Canada, Peale's peregrine in the Pacific Northwest and Aleutians, and the American peregrine in the rest of the continent.

Adult peregrines are 15 to 20 inches long from head to tail and have a wingspread of about 43 inches. Preying on birds, they may live for 12 years or more in the wild, but a more normal life span is probably four or five years. The peregrine nest is customarily located in the side of a high cliff. Peregrines tend to use the same cliffs or "aeries" for nesting year after year.

Peregrines once nested on the cliffs bounding the Illinois and Mississippi rivers. In the mid-1960's the falcons, their numbers drastically cut by DDT and other pesticides, disappeared as nesting birds from all areas east of the Mississippi River. Peregrines are now seen in Illinois only during times of migration.

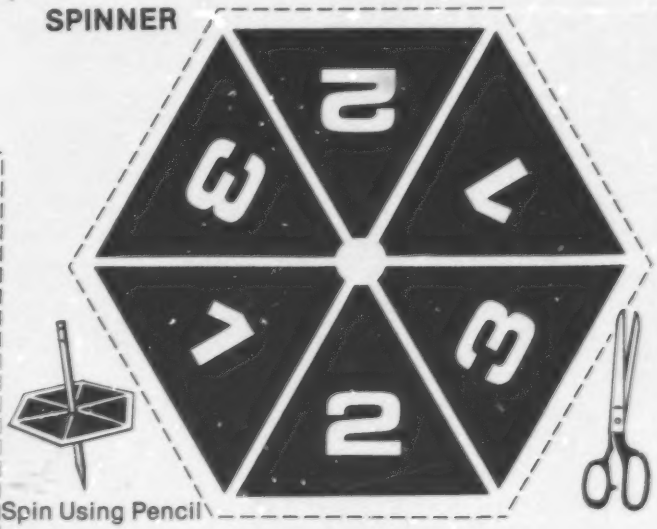
DIRECTIONS:

1. Use one spinner and a playing token for each player. Insert pencil in spinner as shown.
2. Put players' names on score sheet below.
3. Player with token No. 1 spins first. Side which lands on table shows number of spaces to move.
4. Player must follow directions on step which token lands on.
5. Each time a player loses a falcon, cross out one falcon on the score sheet after that player's name. A player who loses all 10 falcons must drop out of the game.
6. Continue playing until all players have reached FINISH. Player finishing with most surviving falcons is the WINNER. If two players have the same number of falcons left, the WINNER is the one who came to FINISH first.

SCORE SHEET

Name	Number of Falcons										Total Surviving Falcons
	1	2	3	4	5	6	7	8	9	10	
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											

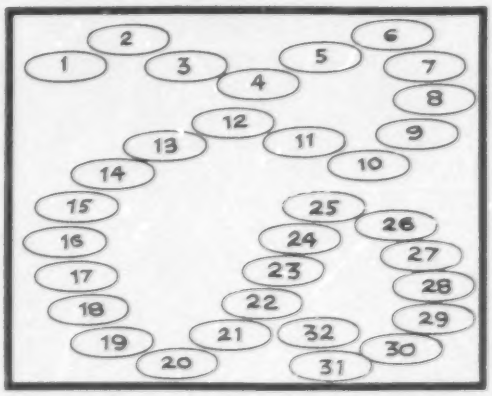
SPINNER



Spin Using Pencil

PLAYER TOKENS

GAME BOARD PLAN



BEST COPY AVAILABLE

GAME SITUATION STATEMENTS

1.
START

2.
Blank Space

3.
A sportsman illegally shoots a peregrine falcon because he thinks all "hawk-type" birds kill too many game birds. (The peregrine falcon is a natural predator of songbirds, pigeons, and waterfowl and does not deplete game bird populations)
(CROSS OUT 1 FALCON)

4.
Blank Space

5.
A team of mountain climbers explore a cliff side where a pair of falcons are setting up an aerie. The presence of the humans drives the falcons away and they fail to breed.
(MOVE BACK 3 SPACES)

6.
An elementary school student in Mount Sterling, Illinois, reports to the class on the life history of the peregrine falcon. The class learns that the peregrine falcon eats only birds, lives and nests along cliff sides, and is one of the world's most magnificent and skilled flyers.
(MOVE AHEAD 2 SPACES)

7.
A resort facility is constructed on a cliff side where a pair of falcons have set up an aerie for many years.
(CROSS OUT 2 FALCONS)

8.
Blank Space

9.
Blank Space

10.
A falconer uses a peregrine falcon in the sport of falconry. Prized for its strength, beauty and flying skills, the peregrine falcon has been used for centuries in the United States and around the world in the sport of falconry.
(STAY PUT)

11.
A person climbs a cliff side and steals 2 young peregrine falcons from their nest. This person wants to use the falcons for the sport of falconry. (Although falconry is practiced in the U.S., it is unlawful to take peregrines from the wild)
(CROSS OUT 2 FALCONS)

12.
Blank Space

13.
The year is 1947. There are an estimated 500 to 1,000 breeding pairs of falcons living in many parts of North America. (Since the widespread use of DDT and other persistent pesticides is just beginning in 1947, MOVE AHEAD 5 SPACES, PLAY THAT SPACE AND THEN MOVE BACK 9 SPACES)

14.
Blank Space

15.
A female peregrine falcon eats too many birds contaminated with DDT and other pesticides. When she lays her clutch of 3 eggs, the retarded egg shells (caused by the pesticides) crack open before the chicks hatch.
(MOVE BACK 6 SPACES)

16.
A peregrine falcon dies after eating too many birds that had DDT and other persistent pesticides in their bodies. These pesticides are passed on through food chains and build up to high levels in the bodies of meat-eaters such as falcons. (CROSS OUT 5 FALCONS)

17.
Blank Space

18.
The year is 1965. Because of DDT and other persistent pesticides, habitat destruction and shooting, there are no nesting peregrines left east of the Rockies. Less than 150 pairs are still nesting in the mountainous areas of the west from Washington to New Mexico.
(CROSS OUT 3 FALCONS)

19.
While diving through the air in chase of prey, a peregrine falcon surpasses a small aircraft, reaching a speed of over 200 miles per hour.
(MOVE AHEAD 3 SPACES)

20.
The year is 1980. Nearly 400 peregrines have been raised in Cornell University's "hawk barn"; many of these have been "hacked" into the wild. (MOVE AHEAD 2 SPACES. DEFINE "HACKING" AND MOVE AHEAD 2 MORE SPACES)

21.
The year is 1970. Cornell University opens its "hawk barn" where they hope to propagate peregrine falcons to release to the wild. The goal is to rebuild the peregrine falcon population in the eastern United States.
(MOVE AHEAD 2 SPACES)

22.
Blank Space

23.
Blank Space

24.
Blank Space

25.
The year is 1972. Most uses of DDT in the United States and some other countries are banned. However, DDT is still used in Central and South America. (MOVE AHEAD 2 SPACES, PLAY THAT SPACE AND THEN MOVE BACK 4 SPACES)

26.
It is the spring of 1980. Four young peregrines hatch in the wild in the eastern United States. Biologists think these young peregrines are the first to be hatched in the East since the mid 1960's. The successful parents were captive bred in Cornell University's "hawk barn".
(MOVE AHEAD 2 SPACES)

27.
Blank Space

28.
Blank Space

29.
In the spring of 1980, Scarlett and Rhett, two Cornell-reared peregrine falcons now living wild, raise two chicks atop the tallest building in Baltimore, Maryland. (MOVE AHEAD 1 SPACE. EXPLAIN WHY A PEREGRINE WILL SOMETIMES ACCEPT A TALL CITY BUILDING INSTEAD OF A CLIFF AND MOVE AHEAD 2 MORE SPACES)

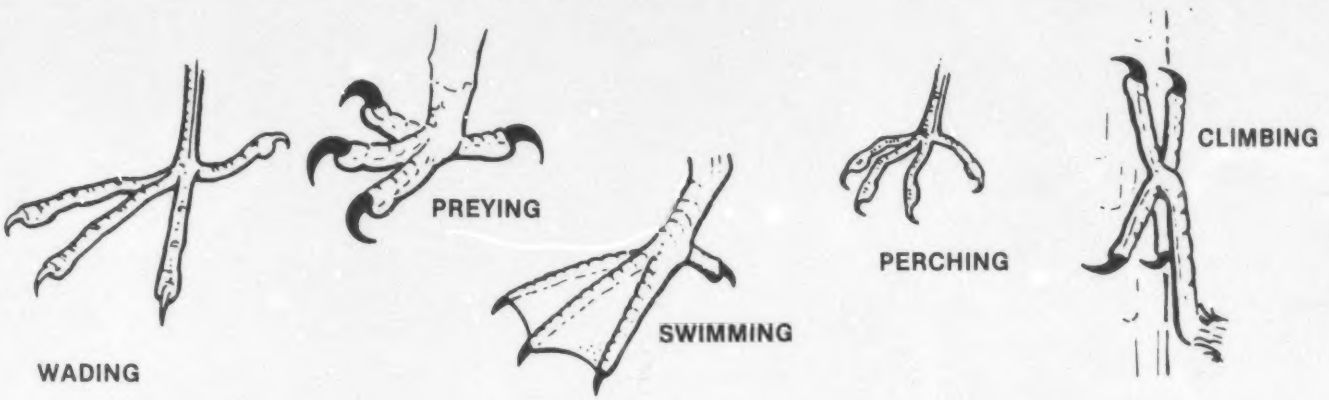
30.
Blank Space

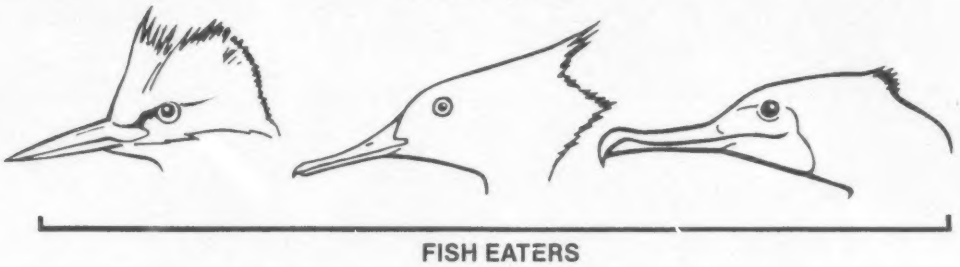
31.
The decade is the 1980's, long-lasting pesticides other than DDT are still being used.
(GO BACK TO START)

32.
FINISH

BIRD APPRECIATION WEEK
BEAKS AND FEET FOR EVERY NEED

A bird's beak and feet are adapted to the special ways in which that bird makes its living within its particular habitat. Define the term "adaptation" and explain how that term applies to a bird's beak and feet. Then study each of the categories of beaks and feet shown below. Name one species that belongs to each category. What is the habitat of each species you have chosen? For the species listed for the beak categories, how does each bird's beak help it to preen its feathers, arrange its nest and obtain and manage its food? For the birds listed for the feet categories, how does each bird's feet help it travel and catch and carry its food? How many toes do most birds have and how are they arranged?

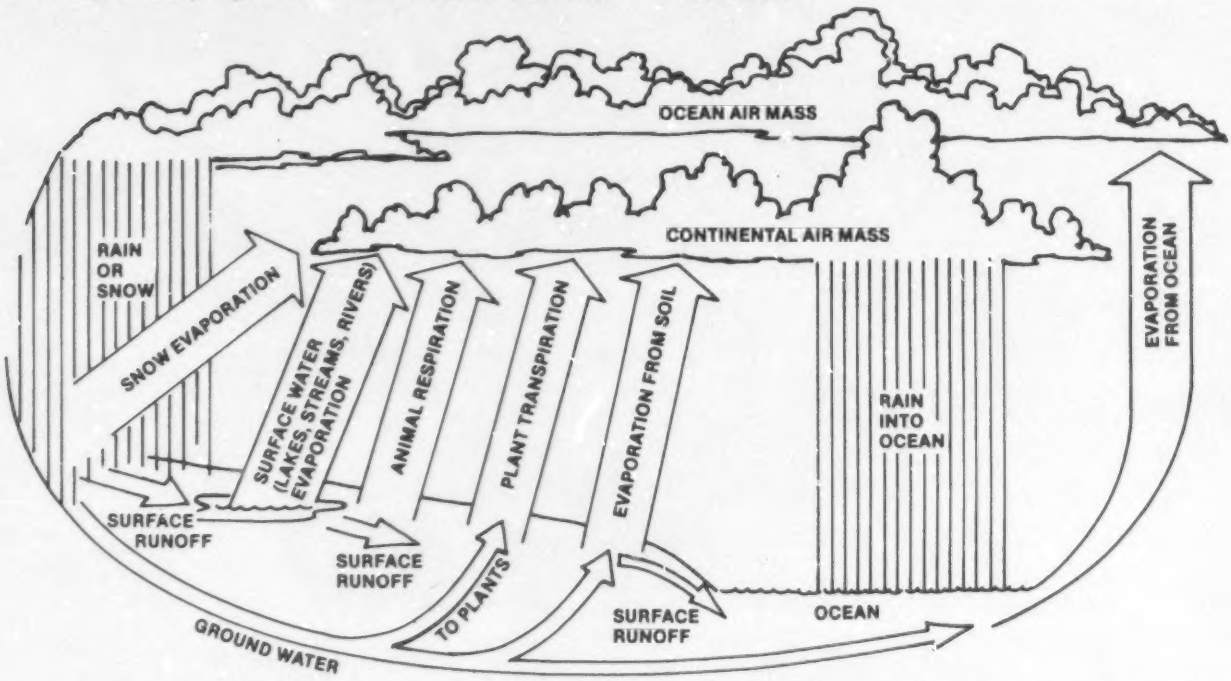




BIRD COLORING PAGE

EARTH DAY

Except for the energy it receives from the sun, the earth is a self-sufficient system. Just with the tools it has at hand, the earth can produce snow and rain and give nurture to plants and animals. But thats not to say that the earth manufactures brand new snow or that it discards old rain into some kind of cosmic sewer, just as people build new houses and tear down old ones. In fact, in the earth's biological system, there is no such thing as new—you could even say that the earth is clothed in "hand-me-downs". The land, water and air of the earth are continually being recycled. The water cycle provides a good example of how the earth recycles its resources.



In the water cycle, air helps purify water, water irrigates plants and plants help renew the air. As you can see, everything that is used in the recycling process is restored and nothing new is ever added to the biological system of the earth.

BUILDING A MODEL

A good way to see first hand how the earth functions as a self-sufficient system is to build and study a terrarium. Like the earth, a terrarium is a self-contained environment which draws energy from the sun.

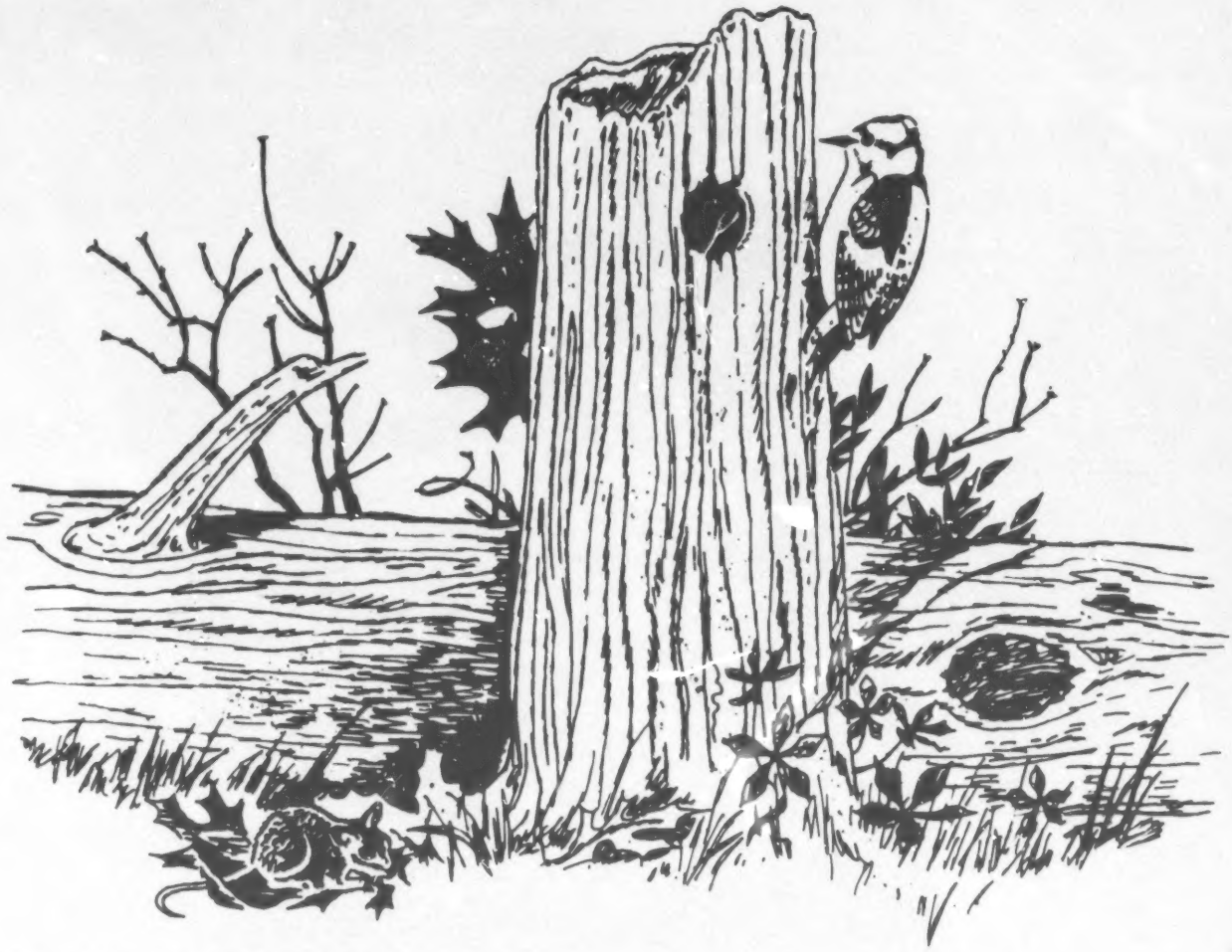
To build the terrarium, put a layer of charcoal in the bottom of an aquarium or large jar. Put an inch or so of gravel on top of the charcoal for drainage, then several inches of soil. If you use a rounded container, the outside can be lined with sphagnum moss.

Now select some small, leafed plants to put into the terrarium. Plant taller plants at the rear and smaller at the front, water the soil to settle it and cover the terrarium with a lid. If you want, you can seal the lid with paraffin or tape, but let the terrarium sit a while before sealing, as the glass may cloud up at first. If the glass does cloud. remove the lid until it clears and let sit a while before sealing.

THINKING FURTHER

1. Using the illustration of the earth's water cycle, explain the water cycle of the terrarium.
2. We have said that nothing new is added to the biological community of the earth. What happens when something is taken away? For example, in relation to the earth's water cycle, what happens when people clear cut forests which transpire water and oxygen? What would happen if you removed the plants from your terrarium?
3. How is the earth's water cycle affected when people build reservoirs which interrupt the flow of rivers. What happens when marshes are bulldozed and swamps drained. Can we expect the recycling process to continue when we dump toxic wastes into the very water we hope to drink? What would happen to the water cycle of your terrarium, if you sprayed a pollutant such as gasoline into its environment?
4. In the past, the earth has brushed aside our interventions in its cycles as pinpricks. But now, these injuries seem to be taking their toll on the earth's biological community. What proof do we have of this? Why are we harming the earth so much more now than we ever did in the past? What can we all do to treat the earth as a partner rather than an enemy?

ARBOR AND BIRD DAY



LIFE IN A ROTTED LOG

Find a good-sized tree or log in an advanced stage of decay. If you choose a log, turn it over to discover what is living under it.

Consider yourself a "forest detective" and answer the following questions.

1. Are there leaves on or near your stump or log?
2. Is there bark on the stump or log?
3. Is the wood hard or soft?
4. What kind of tree did the stump or log come from?
5. Is the wood moist?
6. If you have chosen a stump, can you tell how the tree died and how long ago?
7. List the invertebrate and vertebrate animals that live in or feed at your stump or log? Can you identify any of them by signs of their remains such as burrows, borings, droppings, nests, eggs, old skins? Are any of the animals you find camouflaged?
8. Are there any plants growing out of your stump or log? If so, are they ferns, mosses, liverworts, fungi, mildew, flowering plants, shrubs or saplings? Draw and label each of the plants you find.
9. If you choose a stump to investigate, are any birds using it? What kinds of birds are they and why do they use dead and dying trees for nesting and feeding?
10. Sketch the food web of your stump or log. Be sure to include insects, reptiles, amphibians, birds and mammals.
11. If not for decay, what would have happened to the earth centuries ago?

After you have finished your investigation, try to leave your stump or log in the same condition that you found it. Turn your log over and put its bark back together so it will remain moist and natural. Though new crevices will probably be formed as a result of your tampering with the log, snakes, toads, salamanders, and mice will quickly take up the new homes.

YOUTH BIRDING CHAMPIONSHIPS

Note to Teachers

A Youth Birding Championship is a good way to introduce the sport of birding to your students. You can conduct a Youth Birding Championship just within your school or you can include several different schools in your area. (Use the posters enclosed in this packet to advertise the contest) **If you conduct a Youth Birding Challenge at your school and write us about it, we will furnish award certificates for the winning students.** There will be a Statewide Youth Birding Championship held in Springfield on the last Saturday in April. Though the winners of the local contests are probably the ones that will travel to Springfield to the statewide competitions, all your students are invited to the event. These are the rules that you should follow in conducting your local contest. These same rules will be used at the State Youth Birding Championships.

1. The competition should be open to two categories. Class I includes students in grades 7 through 9 and Class II includes students in grades 10 through 12.
2. Hold the competitions in the early morning, as soon after dawn as possible in a park or nature area.
3. While the students are registering for the contest, have several responsible people go over the area and compile a master list of which birds are present.
4. Students are entitled to carry a bird identification book, binoculars, a pencil, and a blank check list. Bird calls or lures are not allowed.
5. After the contest officially begins, the students will have one hour to search for birds.
6. Participants must work independently—since they are competing with each other.
7. Parents will not be allowed to assist contestants with the identification of birds.
8. Participants may visit any part of the contest area during the one hour time period and are allowed to record any species observed flying, swimming or perched outside of the area as long as the participant remains within the boundaries of the area.
9. Towards the end of the time period, the official should blow a five-minute whistle and then a final whistle. Students should return to the starting place promptly and turn in their check-lists.
10. Judging. The official should count only the birds that are known (by record of the master list) to be in the area. The official should subtract the number of incorrectly listed birds from the number of correctly listed birds to arrive at a final score. The participant with the highest score is the winner. Recognition should be given to all students who participate but especially the three highest-placing individuals.
11. For award certificates, write: Division of Forest Resources and Natural Heritage, Illinois Department of Conservation, 605 Stratton Building, Springfield, IL 62706.

THE STATEWIDE YOUTH BIRDING CHAMPIONSHIPS ARE SLATED FOR THE LAST SATURDAY IN APRIL.

PLACE (Lincoln Memorial Gardens)

TIME Registration begins at 8:30. Competition and awards will conclude approximately by 11:30.

AWARDS Trophies will be awarded to the top three contestants and certificates will be presented to other participants.

BE THERE!

YOUTH BIRDING CHAMPIONSHIPS

A Field Day of Birding Competition

OPEN TO ILLINOIS STUDENTS IN GRADES

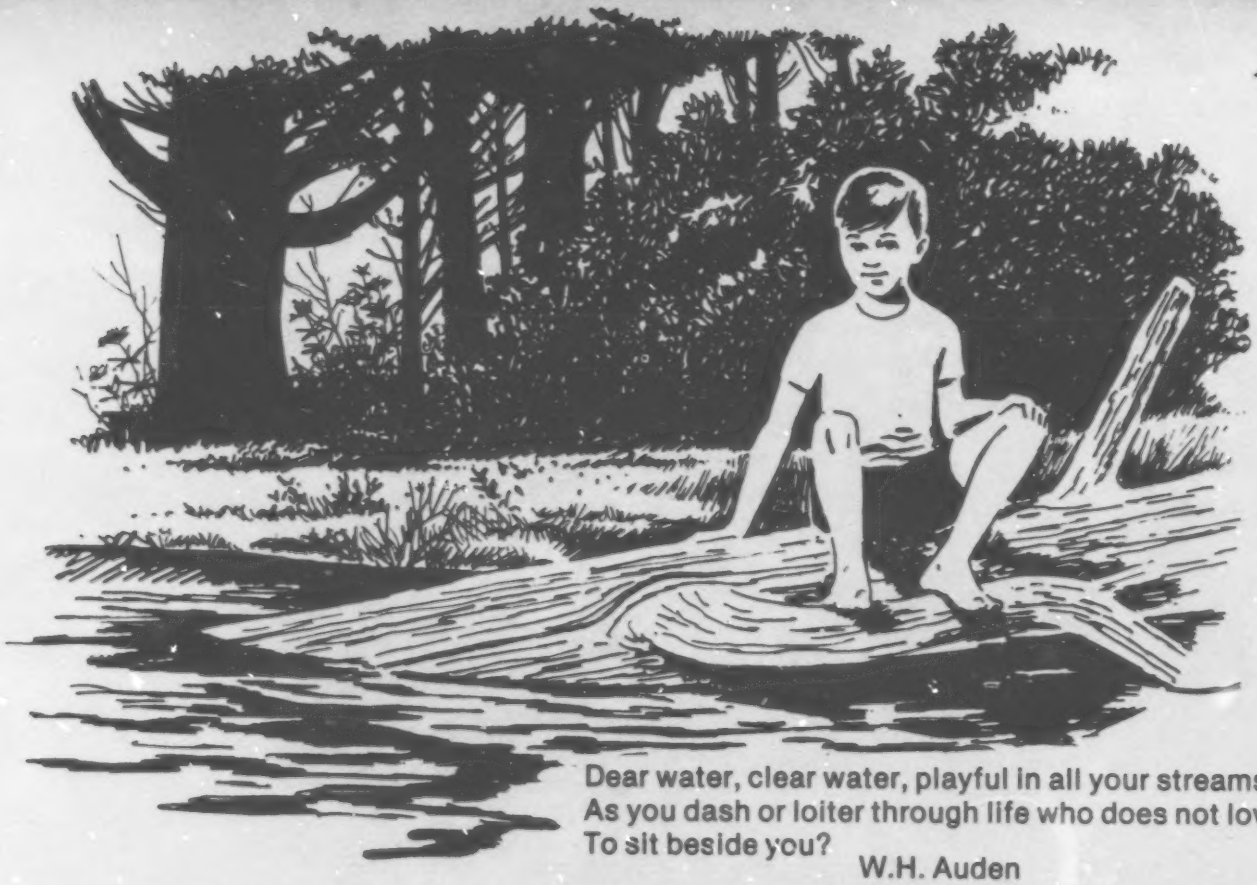
7-9 (Class I)
10-12 (Class II)

Check with your SCIENCE TEACHER for the Local Competitions

All students are eligible to compete for trophies in the

STATEWIDE CHAMPIONSHIPS in Springfield

on the last Saturday in April



Dear water, clear water, playful in all your streams,
As you dash or loiter through life who does not love
To sit beside you?

W.H. Auden

ILLINOIS CLEAN STREAMS MONTH - MAY

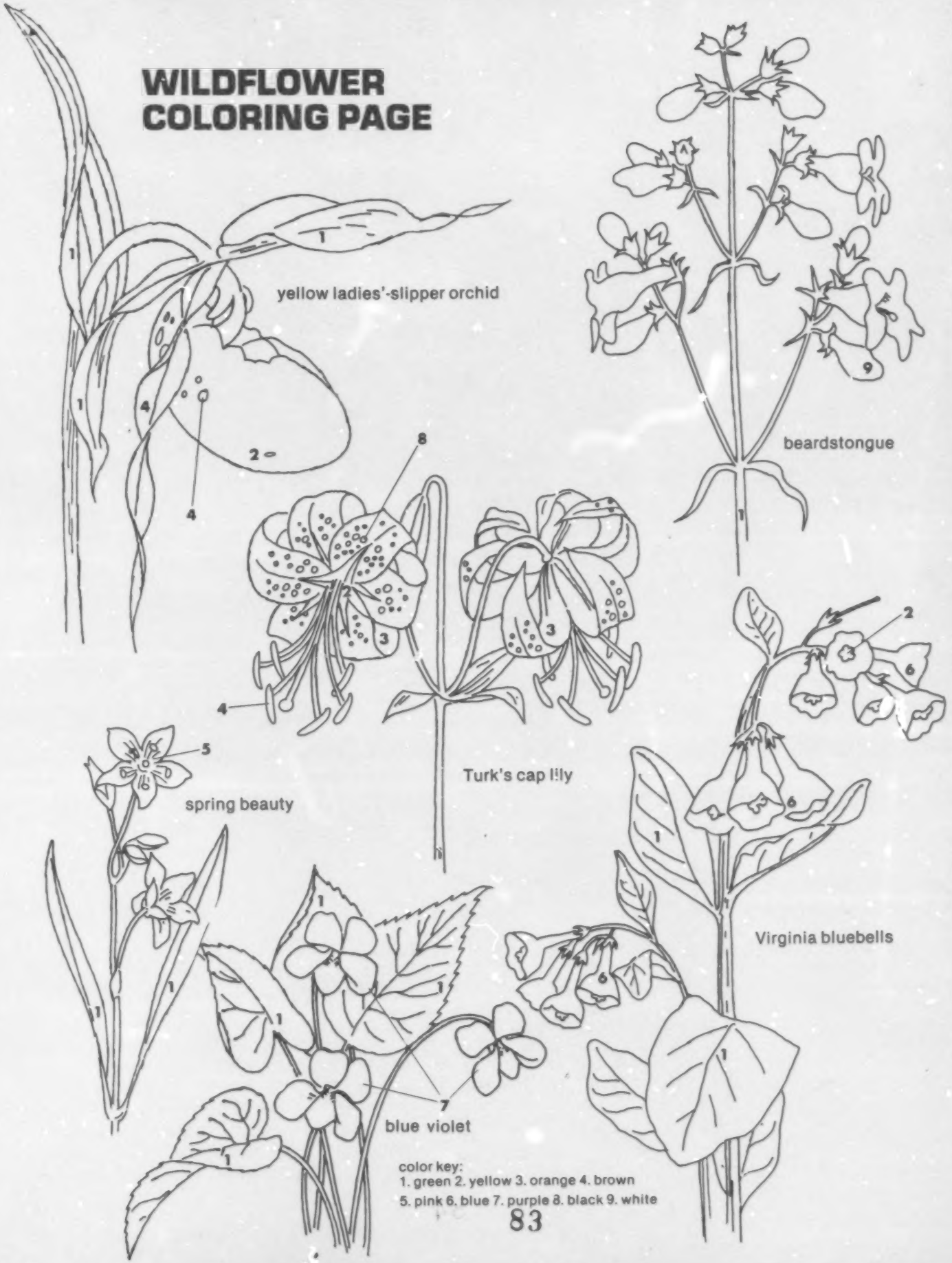
Clean Streams Month is a time to remember, a time to think and a time to act. It is a month for remembering how precious our water resources are, and that none of the earth's functions could continue without them. It is a month for thinking about the condition of our water resources and about how we can restore and keep them clean in the future. And Clean Streams Month is a time to carry out clean-up projects along creeks, streams, rivers and lakes and ponds. Is there a creek or stream near your school that is loaded with old tires, beer cans, and other junk? If so, organize a spring clean-up. You may also wish to write your congressperson about laws that are now being proposed to protect water resources.

THINKING CLOSE TO HOME

Water pollution is a problem that threatens nearly every area in the United States, including Illinois. From 1962 to 1980, over 12 million fish were killed in over 1,600 miles of polluted Illinois waterways. Many of these areas were probably near your home. Write down the causes of water pollution, and answer the following questions.

1. If you have a stream near your school or community, do you know where it starts? Does the water in your stream ever reach the ocean?
2. What kind of fish and other animals live in a nearby stream or lake?
3. Does your school get its water from a well or from a water treatment plant? If from a well, how deep is the well? If from a treatment plant, what is the route of the water pipes from treatment plant to your school?
4. Where does the wastewater from your school go?
5. Do you know of someone in your area whose well went dry? Why did the well go dry?
6. Are there springs in your area? Is the water safe to drink?
7. Do you ever see articles in newspapers and magazines on water pollution and fish kills?
8. If you brought in a gallon of water from a muddy stream, and let it sit for several days, sediment would collect on the bottom. Where does this soil come from? How can we keep this soil out of the water? Is the water now safe to drink?
9. Using a map, locate a major river in your area. How might the early explorers, Indians and settlers have used this river?
10. What we do here in Illinois can effect plants, animals and people thousands of miles away. The litter on your school playground can be carried by wind or water to a nearby stream. How can collecting litter on your playground help protect an ocean?
11. Look around your schoolgrounds to find an area where the land slopes. Is soil erosion occurring? Where is the soil going? What can be done to stop soil erosion?

WILDFLOWER COLORING PAGE



color key:
1. green 2. yellow 3. orange 4. brown
5. pink 6. blue 7. purple 8. black 9. white

NOTES